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THE PATHS AND CHARACTERISTICS OF MIGRATORY ANTICYCLONES IN SOUTHEAST ASIA

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THE PATHS AND CHARACTERISTICS OF MIGRATORY ANTICYCLONES IN SOUTHEAST ASIA

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1 July, 1945

(with inclosures — maps — numbered 11 to 41)

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INTRODUCTORY

It is the purpose of this paper to acquaint the forecaster who has little access to weather data outside the geographical borders of China with some of the weather phenomena that occur beyond his most northern reporting stations, phenomena that are closely associated with the weather in China. The synoptic picture of the entire Asiatic continent is of course a continuous pattern of related systems, and the weather of each section has its influence on the weather of adjoining regions. When a forecaster views the weather of only one section for a long period of time, it becomes exceedingly difficult for him to grasp this relationship, and often the large scale picture is lost. Since much of China's weather is dependent upon systems that enter her borders from Siberia and Outer Mongolia, it is obvious that a knowledge of the weather phenomena in these areas will be extremely useful to the China forecaster. While this knowledge may not improve the accuracy of the forecasts for his own terminal, it will improve his ability to forecast for larger areas, and most certainly extend the range of his forecasts.

Analysts at the Weather Central are fortunate in having at their disposal current synoptic weather maps of the entire Asiatic continent; also historical weather charts of the Northern Hemisphere for the period 1898 to 1938. With these tools, any forecaster will in time observe various trends and correlations that prove themselves useful forecasting aids. This paper is a discussion of one of the most useful weather phenomenon observed at the Weather Central, after a study of the large scale transitions that occur in the pressure patterns over the continent.

Unquestionably the most important aid to forecasting for southeast Asia, principally China, Korea, and the Japanese islands, is a knowledge of the paths and other characteristics of migratory anticyclones through this area. China forecasters are well aware of the close correlation between closed anticyclones over China and "good" weather. With the exception of the Yunnan Plateau, all of China depends largely on migratory anticyclones for good weather during nine months of the year. Days of clear to scattered skies, in other words, days of optimum operational weather, that occur during the transitional months of April and May, September and October, not attributed to the influence of migratory high pressure cells are rare; during the period November through March, such cases are practically non-existent. The importance of being able to forecast the direction and rate of movement of these migratory anticyclones thus becomes apparent to anyone who has spent six months, possible less, attempting to forecast Chir weather. An accurate knowledge of the characteristics of migratory high cells might well be termed essential to forecasting good weather for north central, and east China, over forty-eight hours in advance. To bring in actual cases: planning forecasts of four to five days in advance, or missior forecasts of seventy-two hours in advance, necessary for the strike missions made against the Japanese mainland from Chengtu bases, would have been impossible had the forecasters involved been deprived of this knowledge.

THE SIBERIAN HIGH

Any discussion of migratory anticyclones over southeast Asia must begin with a brief review of some of the characteristics of the semi-permanent "Siberian" high, since during at least seven months of the year the majority of migratory cells that enter China have their origin in this larger and more intense high pressure cell. To begin with, the Siberian high, even during midwinter, cannot be called a permanent one; it is at best what might be called semi-permanent, because during the months of December, January, and February, when it is strongest, the Siberian cell wanders about considerably. It may move as far as three thousand miles in one week, or in some instances, disintergrate completely. The mean position of the center of the high at the height of the winter monsoon is most commonly thought to be in south-central Siberia in the Lake Baikal Region - hence its name.

Dr. Chang-Wang Tu places the mean center in the Gobi Desert during the month of January.[1] Actually, during the period 1931-1937, the mean position during the months of December, January, and February, was found to be along the Siberian-Mongolian border just west of Lake Baikal, so that during any particular year, or short span of years, the center of the Siberi high might spend most of its time in either outer Mongolia or Siberia. Since such positions are "means" to begin with, a knowledge of these positions for mid-winter months is not too important.

Every China forecaster is well aware of the dominating influence the Siberian anticyclone has on the circulation over China during the Winter Monsoon season. If not, a quick glance at the mean monthly air current charts included in Dr. Chang-Wang Tu's paper, "A preliminary Study on the Mean Air Currents and Fronts of China", would refresh his memory. There are however other observations regarding the behavior of the Siberian cell that merit attention.

According to Bugaev and Georgio[2], the polar Siberian air may have three origins. One source is the Arctic Greenland air, by the USSR classification, or Maritime Arctic according the Bergeron. The source region of AG air is just north of Greenland. This air mass moves down across Spitsbergen, through Barents Sea, then across the Urals into northern Siberia where it is transformed into Polar Siberian air. Another source, the air that moves directly south into western Siberia, is called Continental Arctic air in both classifications. This air originates in the Arctic region northeast of Novaya Zemlya, moves across the Gulf of Ob into western Siberia. Still another source is the air that originates near Iceland then takes a more southerly route into Europe where it is first transformed into Polar European, (USSR).[3] The intrusion of this Polar European air from the west may cause anticyclogenesis with the result that Polar Continental air (Polar Siberian air because of its location) is formed. Of the three, the most frequent source of Polar Siberian air appears to be the Maritime Arctic, at least this was true during the years studied, 1931 through 1937. Multanovsky observed that Maritime Arctic air enters Siberi via two main routes during the winter season, and plotted the mean paths b which anticyclones from the N. Greenland-Spitsbergen region enter Siberia.[4] Most frequently, the Maritime Arctic air passes through the Greenland Sea,

[1]Chang-Wang Tu, "A Preliminary Study of the Mean Air Currents and Fronts of China," Memoir of the Nat'l Research Inst. of Met., Vol. XI No. 3, September, 1937, Page 5.

[2]Bugaev and Georgio, "The Classification of the Air Masses of the USSR," Meterologia Hydrologia, 1940, Vol. 6, No. 12, PP 35-45. Trans. from the Russian by G.S. Michell, Page 5.

[3]Ibid, Page 5.

[4]Pagava, "Basic Principles of the Synoptic Method of Long Range Weather Forecasting," translated in military intelligence Div., WDGS, prepared by Weather Information Service Hq., AAF, Page 34

across Lapland, moves southeastward between Lake Ladoga and the White Sea, down the upper Volga Valley, and enters western Siberia via a route lying south of the Urals but north of the Aral Sea. The second, more northerly and less frequently traveled winter route, begins over northeast land, moves down through Barents Sea, passes west of Novaya Zemlya, and enters western Siberia just south of the Gulf of Ob.

These intrusions of Arctic air, that are transformed into the semi-permanent Siberian anticyclone by the time they reach eastern Siberia, may best be followed on five day mean pressure maps. These charts mask daily transitions and bring out only large scale movements. Using mean charts, the forecaster with sufficient Siberian data can readily observe the beginning of the Siberian high long before it centers over eastern Siberia. The polar outbreak or intrusion of Arctic air that was first noted on the Weather Central Analysis of 26 January 1945 is an excellent example of how the Siberian high is established. The anticyclone was first noticed on 26 January entering European Russia from the Barents Sea with a sea-level pressure at the center of 1041 millibars. The anticyclone continued to move slowly eastward, building up each day, until it reached its maximum intensity of 1056 millibars 31 January to 2 February after stagnating in southern Siberia just west of Lake Baikal - Practically in the mean position for January. The high remained in this general area until 10 February. It decreased in intensity to 1044 millibars by 8 February; by the 10th, the high indicated splitting; and by the 11th, this process was quite definite. By the 12th, it became two cells; one of 1044 millibars moved off to the northeast, while the other (1038 millibars) moved south into Outer Mongolia. On the 16th of February, the last day the anticyclone in Outer Mongolia could still be identified as part of the Siberian high, it began disintegrating as a cyclone entered the area east of Tomsk. The enclosed five day mean charts prepared from the Weather Central daily synoptic maps during the period 26 January to 19 February, show the complete process from beginning to end. In clear-cut cases of this sort, the influence of Polar out-breaks on the weather of southeast Asia may be accurately forecast two weeks in advance. In forecasts of this type, other aids, such as daily indices, normal indices, and pressure profiles are used to supplement the five day mean charts. The Siberian high in its semi-permanent position quite often attains such intensity that its influence is extended over the whole of east Asia. The enclosed copy of the Weather Central Analysis for 6 December, 1944, is a good example. This particular cell built up to a pressure at the center of 1068 millibars. The normal intensity seems to range between 1040 and 1070 millibars during the winter months. Various meteorologists place the depth of cold air during mid-winter close to six thousand feet.[1]

The difference in the mean positions of the semi-permanent Siberian high during the year indicates clearly why the weather of east Asia is divided into seasons unlike those of North America. These seasons are commonly referred to as; (1) The Winter Monsoon Season, consisting of the calender months, November, December, January, February, and March; (2) The Spring Transitional Season of April and May; (3) The summer Monsoon Season, June, July, and August; and (4) The autumn Transitional Season of September

[1]Bugaev and Georgio, Page 5.

and October. During the period 1931-1937, the mean position of the Siberian high in November was found to be in the area north of Lake Balkhash. By November, the Siberian high is sufficiently strong as to dominate the flow over the eastern half of the continent. Thus with the establishment of this prevailing flow out of Siberia, which enters south China from the northeast and extends as far south as Formosa, the Winter Monsoon season begins. During the month of December, the Siberian high reaches its peak and extends its influence as far south as the Equator, and out over the western Pacific.[1] In the period 1931-1937, when considerable Siberian data were available, the mean position of the cell in December was found to be in northern Outer Mongolia, southeast of lake Baikal. During the months of January and February, the mean position was found to be just across the Siberian border, still in the vicinity of lake Baikal, with the dominating influence of the Siberian anticyclone as far reaching as in December. In March, the last month of the winter season, the mean position and general characteristics of the high are similar to those found in November. The high is less intense, it disintegrates more often, and move further west. During April, the mean position of the Siberian high was found to be the same as in March - there is a marked difference however for in April, the Siberian cell is rarely of sufficient strength to dominate the flow over east and southeast China. In May, the high continues to weaken, and moves eastward to a position northwest of lake Balkhash. Although the high occupies this position more often than any other, it might well be called a migratory high itself, and almost all permanency of position is lost. During the next three months, the Summer Monsoon season, no anticyclone remains in one location long enough to be given a name. The Siberian cell has disappeared completely, although many weak highs of 1008 to 1020 millibars pressure travel across central Siberia in this season. The autumn transitional season, as might be expected, is the reverse of the spring season. Anticyclones entering Siberia during September are able to maintain themselves for a considerable length of time, and of course, build up more often and stagnate more frequently, with the approach of the Winter Monsoon season. The mean location of the Siberian high was found to be northwest of lake Balkhash during both months of the autumn season.

With this seasonal behavior of the semi-permanent high pressure cell in mind, an understanding of the manner in which migratory anticyclones break off and move southward through China is more easily acquired. The behavior of the Siberian high helps explain the seasonal and monthly changes in the characteristics of the Migratory highs.

MIGRATORY HIGHS

The value of using the mean tracks of migratory anticyclones in forecasting was first noticed at the Weather Central early in the spring of 1944, when the tracks of individual highs were plotted for a period of about five years - the data being obtained from "Historical Weather Maps" of the Northern Hemisphere prepared in a joint project by Army, Navy, and Weather Bureau meteorologists. Anyone who examines these historical charts

[1]Chang-Wang Tu, Page 2.

notices at once that the data over large parts of Asia are sometimes quite scarce - a fact that would cause any forecaster to question the reliability of the analyses on specific occasions. Therefore the accuracy of any mean anticyclone tracks could not be determined until they were checked against current data. During 1944 and the spring of 1945, it was possible to compare the tracks of current highs with the mean paths determined from the historical charts. The comparison showed that the migratory highs on the current synoptic maps followed the mean paths more closely than it was ever hoped they might. The degree to which migratory anticyclones can be relied upon to follow the mean paths through China, the China Sea, and the Japanese Islands, once they have detached themselves from the mean Siberian Cell, is truly amazing; hence their enormous forecasting value. For this present study, the historical charts for the seven years 1931 through 1937 were used, and mean paths redetermined for each month of the year. This particular period was chosen because on an average, more Asiatic data were available during this period than any other, leading to the assumption that the daily analyses during this period would be more reliable. To make certain that this period was representative, mean paths were determined for several months using analyses picked at random from the longer period 1898 to 1938. Paths thus determined were found to follow the identical course of those determined for the shorter period, 1931-1937.

Although a knowledge of the path a high cell moving down into China will take is of the greatest importance when it comes to forecasting, an idea of the velocity with which it moves, its expected intensity, and other characteristics of minor importance are of value. A glance at the diagrams of mean paths prepared for each month of the year show immediately the large variation in their location from season to season, and also the gradual shift of position from month to month. The migratory anticyclones likewise vary in speed, regularity of movement, and intensity from month to month. This does not mean of course that it is not possible in the last half of March for migratory cells to follow the "April" track, or for highs in the first half of March to follow the "February" track. "March" weather refers to the weather "normally" occurring in that month, and does not necessarily correspond to the thirty one calendar days of any specific month. This occasional shift of seasons from year to year is noticable in almost all the weather data available to the forecaster, with the result that the value of the mean tracks of anticyclones is not decreased.

Because the migratory anticyclones do vary in their behavior from month to month, it is best to discuss them in this manner, month by month.

SEPTEMBER

September is a good month with which to begin a discussion of the migratory anticyclones that move across southeast Asia in that it is the first month of the autumn transitional season, and the first month that anticyclones are of sufficient intensity to move across in a regular fashion, follow the mean track closely, and move with a fairly constant and predictable velocity. The anticyclones travel further west through the China area than during the following months. This often results in a number of them stagnating in the Chengtu Basin. In this respect, the highs behave exactly as would be expected in a period lying between August, when the highs stagnate in the Basin most of the time, and October, when a much smaller number enter the area west of 110 Deg. E. During September, the pressure field over all Asia is extremely flat, and the highs vary in intensity from 1020 to 1025 millibars. These highs enter western Siberia from Barents Sea, follow a course between 50 and 60 Deg. N. until they turn south just west of Lake Baikal. They move steadily across the continent, entering China near the northwest bend of the Yellow River, and continue to move southward; quite a few stagnating in the Chengtu Basin, but by far the majority continuing on at a steady rate of movement until they are off the China coast, where they pick up speed. Thus they are truly migratory highs from the moment they enter Siberia. The intensity of the anticyclones as they pass through China is on an average, around 1017 millibars, (varying between 1014 and 1020 millibars). The highs are practically "doughnut" shaped, and rarely elongate along their axis of movement. This fact is extremely important since the forecaster cannot expect the cell to indicate its direction of movement by its shape. The highs do elongate once they reach the eastern sea, and move northeastward through the Sea of Japan. The highs that enter the Chengtu Basin may stagnate there for three or four days before being pushed out by another high moving in from the north. By September, the Gobi Desert has cooled sufficiently as to permit all highs that move across it to continue on into China. During this month, these migratory anticyclones follow the mean path so closely, and move with such regular velocity, that September is one of the most favorable months of the year to carry out operations against the Japanese mainland. The fact that a large majority of the highs enter the Sea of Japan, make operations even more favorable during this month. Despite the probability of some of the highs stagnating for a while in the Chengtu area, while they are moving, they move with a regular and predictable velocity. Cells that enter the Chengtu Basin travel along a more westward path, and the forecaster can relay on pressure tendencies to the east of the area to indicate the moment the high begins its eastward movement. Another high moving in from the north is likewise an indication. Still a third, is the intensity of the cell - the stronger the high, the more likely it is to stagnate. The average velocity of the migratory highs through China is 4 to 5 Deg. Lat. per 12 hours. The velocity increases slightly as they elongate off the China coast and move into the Sea of Japan. During the period 1931-1937, an average of 4 migratory highs entered China in September. In this month, China experiences some good weather that cannot be associated with migratory highs, but a sizeable number of the days of good weather in north, central (including the Chengtu Basin), east, and south China, can be attributed to their influence.

OCTOBER

In the month of October, a large majority of anticyclones that enter China are still migratory all the way across Siberia. These highs vary in intensity from about 1035 to 1040 millibars and maintain that strength until they enter the Gobi Desert. The semi-permanent Siberian high is not often sufficiently established to enable it to stagnate anywhere along its course. A few do stagnate for a short period in Outer Mongolia, before entering China however. These are highs of greater than normal intensity. When the Siberian high is strong, as during the last days of the month, migratory cells may be formed by a splitting of the main high. This breaking off process is initiated by a cyclone passing just north of the high. The path that the migratory highs take in October shows a striking difference from the path in September. The path is much further north. Highs rarely enter central China west of 110 Deg. E., and a still smaller number enter the Chengtu Basin. For this reason, the number of days of good weather in the Chengtu area drops off rapidly. During October the Chengtu Basin, central, and east China, must depend almost entirely on these migratory highs for good weather. Contrary to what is sometimes believed, the highs that bring good weather to the Chengtu Basin in October, as well as later months, are usually centered in the area between Sian and Peiping. A majority of the highs pass north of the Yellow River until they are over the coast. During October the migratory anticyclones are more intense than in September, having a mean pressure at the center of between 1020 and 1025 millibars as they pass through China. These highs move with greater regularity in October than in any other month. They maintain a relatively constant velocity over a longer period, and consequently, permit accurate forecasts further in advance. From the forecaster's point of view, October is the best month in which to carry out operations over Korea, the Yellow Sea, and Japan proper. It is the best compromise between summer and winter situations. Anticyclones of greater than normal intensity will occasionally stagnate in east China, in the vicinity of Hankow. This will happen when there is no "pushing" force behind them, (another, colder, high entering China from the north); but by far the majority of the highs do not stagnate in this area; instead, continue their steady movement across the Yellow Sea into the Sea of Japan. Again, as in September, the highs are very circular, or doughnut shaped, until they pass the China coast. The average velocity of migratory highs as they move across China is about 4 Deg. Lat. per 12 hours, and during the seven year period studied, an average of 4 to 5 entered China during the month.

NOVEMBER

In the first month of the winter monsoon season, the Siberian high builds up considerably compared to the previous month, with the result, that on an average, migratory highs that move across Siberia travel further east before turning south. The highs that move into China have an average pressure at the center of about 1035 to 1040 millibars while they are in the region of Lake Baikal or the Gobi Desert. As they move across China, they maintain an average pressure of about 1025 millibars at the center. Migratory cells that enter China in November are most frequently highs that have made a non-stop journey across Siberia. While the pressure at their center is greater than in October, few are able to stagnate in Siberia. Those that do may split into smaller, migratory highs by either a cyclone entering the area of the high itself, or by one passing north of the high. The change from the October path is a gradual one. Most of the highs move across China slightly further north than in October, and pass directly over the Japanese Islands, instead of along the more northerly course into the Sea of Japan. As would be expected from the mean path, a smaller number of highs move into east central China, and those moving into the area south of the Yangtze are extremely rare. The highs that do move as far south and as far west as the Chungking-Hankow area frequently stagnate for 24 or 48 hours depending on their intensity. These highs travel along a path more north-south in its orientation than the mean, and maintain their strength, or in some instances, build up in the Chungking-Hankow area. Once the highs have entered this area, they invariable make a right-angle turn and move due east. The fact that the highs can be depended upon to move directly east is of great value in forecasting. They elongate along their axis of movement once they begin moving out of the Hankow area. Migratory highs continue to move very regularly and with a relatively constant velocity during November, so that their position may be forecast well in advance. The average velocity of the highs increases slightly over the mean velocity for October, to 5 Deg. Lat. per 12 hours. During the seven year period studied, an average of 4 to 5 migratory cells entered China during November. This figure may be expected to vary considerably from year to year, depending on whether the winter monsoon season arrives earlier or later than "normal".

DECEMBER

The few migratory highs that enter China in December travel further north than in any other month of the year. The number decreases abruptly to an average of only two per month. The movement continues to be very regular and dependable, although the velocity has decreased to about 3 Deg. Lat. per 12 hours across China, and then increases to an average of 5 Deg. Lat. per 12 hours off the China coast. The average intensity of the migratory cells likewise increases over the previous month to 1032-1041 millibars which accounts for the slower velocity. The highs frequently stagnate in the Gobi Desert, and for the first time, in the Yellow Bend Area between Sian and Shempa. Since the highs are generally squeezed in between two fronts oriented NE-SW, they are the usual doughnut shape. A feature that seems to characterize practically all migratory highs of southeast Asia. Contrary to November, when most of the highs entering China travel steadily across Siberia, the majority of migratory cells are formed by breaking off of the now well established Siberian high. When the Siberian high has a pressure at the center of 1050 millibars or above, it is practically stationary. In this case, migratory highs are formed by three processes. Cold fronts or cold type occlusions, with well developed cyclones, move across northern Siberia and trail down across Lake Baikal and the northern edge of the Siberian high. The front pushes a bubble of the main cell off ahead of it without disturbing the cell too much. The front is then noticable in China as the end of it drags across the Yellow River bend. Another and more frequent phenomenon - frontal systems move across from eastern Europe with the cyclone center along 50 Deg. N. Lat. these cyclones pass through the southern edge of the Siberian high and break off a smaller cell that moves across north China. The cold fronts associated with these cyclones are those that pass on down through western and central China during the mid-winter months. Next in frequency, is the formation of migratory highs by a splitting of the main Siberian anticyclone over Lake Baikal. One part of the high moves northeast into the Lena River basin, the other southeast into China. This breaking up of the main Siberian anticyclone is caused by frontogenesis along a line oriented NE-SW between the Sea of Okhotsk and Urga. The significant fact that is common to all of these three processes is that, in every case, the anticyclone behind the front is much more intense than the migratory cell. Consequently, the gradient behind the front is very strong, and the good weather under the migratory high is followed immediately by frontal weather. During December, when the intensity of the Siberian anticyclone decreases to 1044 millibars, the main high itself begins to migrate. This occurs in advance of a polar outbreak, and as this high moves across northeast China, another high moves across Asia to take its place. A very pronounced frontal system separates the two anticyclone These fronts also move down into west China. The cyclone center is usually north of 60 Deg. N. Lat. while the end drags across Tibet. The Siberian cell will not move down when the central pressure is 1044 millibars or less if it dominates the whole of Siberia and there are no other strong anticyclones to oppose it, or cyclones to weaken it. It must be pushed out by a colder air mass more dominating than itself. Migratory anticyclones formed in this manner are perfectly round in shape, and are not just a "bulb" detached from the main cell. Migratory cells as they pass through north China during December, and the other mid-winter months, bring good weather to the Chengtu Basin and central China, when the high is centered in the area between Sian and Peiping. Rarely do they pass south of this area. During the mid-winter months the Chengtu Basin will not experience good weather until a migratory anticyclone detaches itself from the main Siberian high. As long as the Siberian high remains one cell, the prevailing air currents entering the Basin are from the northeast or north-northeast with the result that Chengtu experiences a middle cloud overcast. It is only when this flow takes a trejectory over southeast China and enters the Basin with a southerly component that good weather occurs. (This type of circulation applies to the gradient winds only, and is not to be confused with the 700 MB Pattern).

JANUARY

Migratory highs in January are comparatively infrequent, an average of only tow entering China during the month, the same number as in December. The highs continue to move very regularly with a slightly increased velocity of 4 Deg. Lat. per 12 hours. Once they leave the China coast, they move very rapidly, with an average velocity close to 8 Deg. Lat. per 12 hours. The average intensity of the highs while moving across China is 1030 millibars with the pressure decreasing to about 1025 millibars as they travel over the Yellow Sea and the Japanese Islands. The migratory highs travel slightly further eastward in Siberia before turning south, and enter China more from the north than in December. This tendency seems to have the affect of causing most of the highs to travel further south than in December;

consequently, more can be expected to stagnate in east China than during the previous month. The highs follow about the same path across the islands as in December. When migratory cells in the mid-winter months follow a more southerly path than the mean, the cells are elongated slightly along their north-south axis. This is frequently caused by the formation of a very deep low over the Sea of Japan. The strong cyclonic circulation thus created has, in some instances, caused a high to enter China from the northeast. Migratory cells are formed by the same processes as in December. Whether the migratory cells are formed by a front passing south of the area of the mean center of the Siberian high, or by a weakening of the cell by the passage of a front through the area itself, will of course, depend on the strength of the Polar out-break. If strong out-breaks are few and far between, then most migratory cells will be formed by a cyclone moving through the area normally occupied by the high, or the area just north of the high (between 60 and 70 Deg. N. Lat.). The existence of an intense low centered over Hokkaido Island is often an indication that frontogenesis will take place along a line extending southwest from the Sea of Okhotsk - with a migratory high as a result. Migratory highs formed in this manner are uncommon when the Siberian high is very strong. In such cases, fronts form and move out across Japan, but are unable to create a closed circulation in advance of it. When the circulation is not a closed one, weather conditions do not improve appreciably. As in December, the Siberian high itself will migrate when the pressure is 1044 millibars and it is pushed out of the southern Siberian-Gobi Desert region. Since a high often builds up in this region, the forecaster must keep a close check on pressure tendencies, to determine the probability of the high migrating.

FEBRUARY

During February, migratory highs are still relatively scarce. An average of 2 per month - because of the strength and dominating influence of the semi-permanent Siberian high. The mean path of the highs is further to the east than that of any other month. A sizeable percentage of them travel along the extreme eastern part of Outer Mongolia so as to have little influence on most of china. During February, only the northeastern part of China proper (and Yunnan) enjoys good weather, and the fact that the few small cells that break off the main high travel so far east explains why. Highs that move as far south as the Hankow area are extremely rare in February. Migratory highs move with a very uniform velocity during this month, more so than in January. The fact that the highs travel further north across the Gulf of Chihli may explain why they have less tendency to speed up after leaving the land; they do decrease in intensity however. The average pressure of the highs is 1030 millibars, while their average velocity is between 4 and 5 Deg. Lat. per 12 hours. Of significance is the fact that a majority of the highs travel south of Kyushu, which doesn't increase the number of days of good weather in this area over the small number in January. Highs passing south of the islands are not likely to bring good weather to this area unless the pressure field is very flat. The mean paths and general characteristics of migratory highs during the three month of December, January, and February, are very similar in most respects, so that methods of forecasting worked out for any one of the three months hold well for the other two. This leaves the greatest changes within the Winter Monsoon Season between the months of November and December, and between February and March. It is during these two periods that the forecaster must be on guard to detect transitions that mean the mid-winter season is either earlier or later than "normal".

MARCH

Through the month of March, the pressure field over the whole continent changes considerably as the Siberian high begins to weaken and move westward. The pattern is broken into many systems with the result that there is an abrupt increase in the number of migratory anticyclones over the previous month - an average of 5 per month, and a majority of these are comparatively weak highs that have maintained a steady movement all along their path from the moment they entered western Siberia. The closeness to which all migratory highs follow the mean path is almost unbelievable. It is one of the most dependable phenomenon the forecaster encounters. The highs move very regularly at an average velocity of about 3 Deg. Lat. per 12 hours. During the period 1931-1937, 1944-1945, it was observed that the highs occasionally have a tendency to stagnate in the Hankow area. A high stronger than "normal" is more likely to stagnate than one weaker than "normal", but again the forecaster will be able to forecast this behavior by keeping a close check on the pressure field as a whole, and especially the 24 hour pressure tendencies. The migratory highs are usually round in shape until they move off the coast into the eastern sea. The observed fact that the highs invariably make a right-angle turn in the Hankow area is valuable to the forecaster. The average intensity of migratory highs in March is about 1025 millibars, and while a few of the cells stagnate in east China for a short period, a large majority continue to move steadily across China, through the eastern sea, and into the Sea of Japan. The highs resume the more northerly course across the islands that was characteristic of autumn. Few highs enter either southeast China, or the Chengtu Basin during this month. Highs centered over east China will bring good weather to the Chen area. The "usual" overcast will move in again when the high leaves the Hankow area, as it now has little influence on the weather west of 110 Deg. E. As was mentioned previously, a majority of the highs entering China have traveled the length of western and central Siberia; although during the first half of the month, migratory highs are formed by other processes. One of these is by frontogenesis. At the beginning and end of the winter Monsoon season, frontogenesis is quite frequent along a line connecting Peiping with the Gulf of Sakhalin. This frontogenetic region has moved southeast of its mid-winter position. As in autumn, migratory cells are also formed by cyclone centers with trailing fronts that enter the area of the Siberian high from the northwest. This usually happens when the general pressure pattern is not far removed from the "February" type. March falls in with September and October in offering fewer difficulties in forecasting for east China and the Japanese islands.

APRIL

The spring transitional season in many respects is the autumn season in reverse. The general over-all weather conditions are slightly different, but many forecasting rules will apply to both seasons with but slight modification. There are normally a larger number of days of good weather during the spring season. By April, the pressure field over Asia is completely broken up, and little resemblance to winter situations remain. The migratory highs that enter China during the month are less intense - averaging about 1020 millibars pressure at the center. All begin as weak highs migrating from eastern Europe. The mean path is practically the same as the March path, and the highs continue to move regularly, with a fairly constant velocity of about 3 Deg. Lat. per 12 hours. The cells move very rapidly across the Gobi Desert from the Lake Baikal region, and slow down to this velocity as they pass through China. As would be expected, the highs have a tendency to stagnate more frequently in the Hankow area or the Eastern Sea than in March - they sometimes remain in the vicinity of Hankow for several days. A 1030 millibar high is likely to stagnate, while those of 1020 millibars pressure or less will continue to move off the coast into the Eastern Sea, and on across the islands, increasing in velocity slightly as they become weaker, a larger number will enter the Chengtu Basin and southeast China than in March, but this number is still comparatively small. During the seven year period, an average of 5 migratory highs enter China during the month.

MAY

The mean path of migratory highs in May lies further to the west than during the previous months - a significant fact, since it causes a much larger number of the highs to stagnate in China or disappear altogether. In the flat pressure gradient that extends over all of Asia, the migratory highs are very weak, having a pressure usually between 1008 and 1014 millibars. They move rapidly across the hot desert and slow down to a halt in Central China. This is the first month of the year that closed highs frequent the region west of the Yellow River bend, and the area around Lanchow. Those that take the more westward course usually enter the Chengtu Basin and remain there for a couple of days. Those that travel further to the east stagnate in east China, bringing good weather to east and southeast China. Migratory highs enter China more often in May than any other month--an average of 6. The mean velocity has decreased from that of the previous month to about 2 Deg. lat per 12 hours. Although weak highs with a fairly pronounced front behind them, move rapidly across central China, they still usually stop in the Hankow area - sometimes for a period of several days. The average strength of migratory highs in May is 1015 millibars. About fifty percent of the 1015 millibar highs stagnate over China. Those of 1010 millibars rarely survive, and disappear over east China; 1015 highs have a tendency to stop in east China for about 24 hours; those of 1020 millibars for about 48 hours. During May, if the summer season is a little earlier than usual, many highs that enter central Siberia will disappear in the heat low over the Gobi Desert. Highs rarely move across east of the Yellow River bend. By May, China experiences a number of days of good weather that cannot be attributed to the presence of migratory highs, thus their importance to forecasting depreciates. However, a large percentage of days of good weather is still the result of their influence.

JUNE

In June, and the other months of the Summer Monsoon Season, the tracks of weak anticyclones that enter China reach their lowest forecasting value. It is interesting to note however, the manner in which they behave, and the part they play in shaping the pressure field over southeast Asia. During June, all highs that move into eastern Siberia are very weak, and those in China have a pressure of about 1011 millibars. The highs move fairly regularly with a velocity of about 5 Deg. lat. per 12 hours until they enter the Chengtu area where they remain for approximately three days. Once they reach east China with sufficient strength, they move across the Yellow Sea into the Sea of Japan at a fairly steady rate. In June, the majority of highs that start out across Asia fail to survive the frequent heat lows that form over the Desert, and they disappear in northern Sinkiang province. Those that do move through the Gobi travel almost due south into the Chengtu Basin. Once in the Basin, the highs disappear after several days, or move eastward to disappear over east China. Highs that are able to maintain an intensity of about 1014 millibars across central China do continue their eastward movement into the Sea of Japan.

JULY

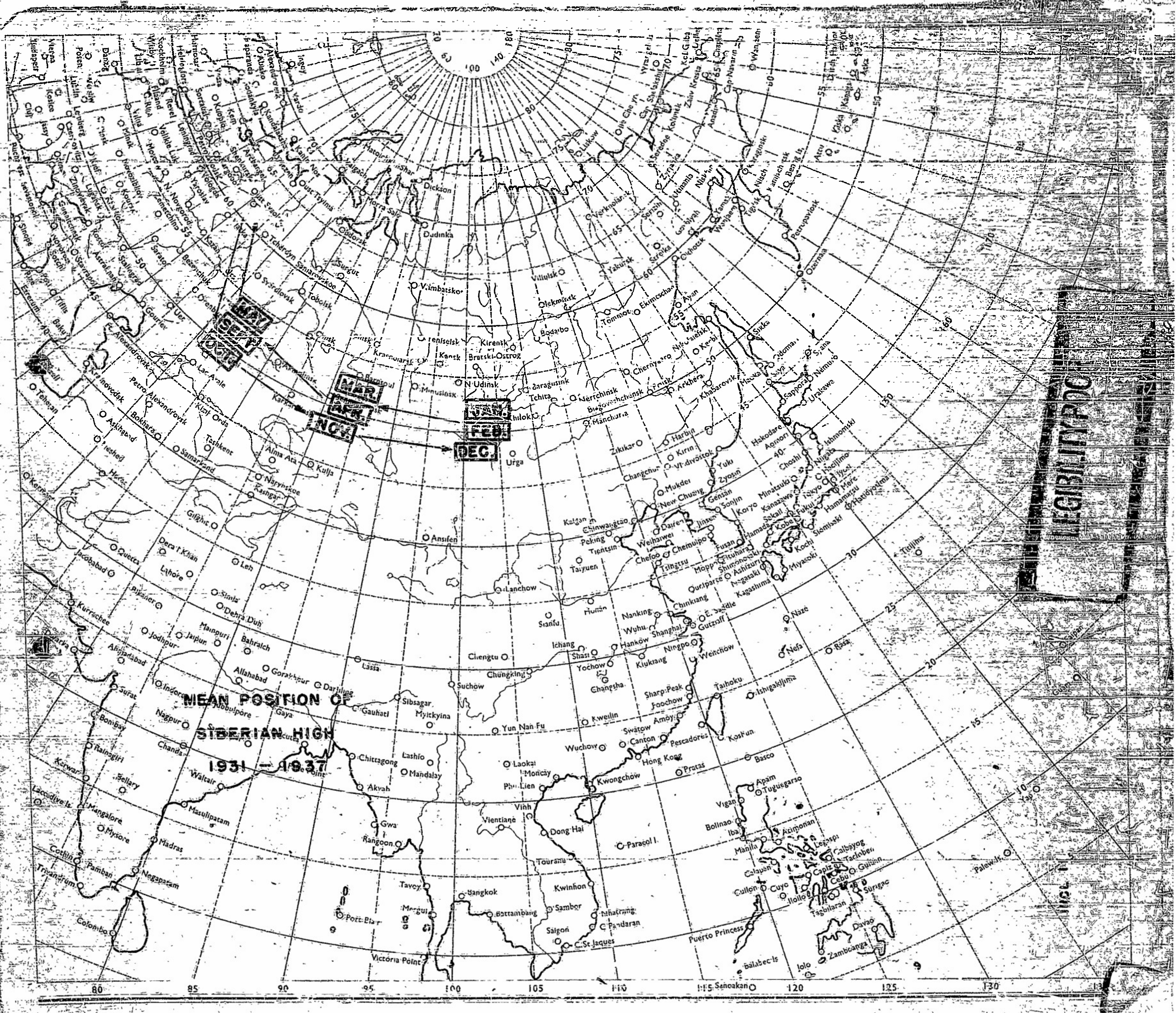
July marks the height of the Summer Monsoon Season, and is the warmest month of the year for much of China. Migratory anticyclones practically disappear from the China weather map. A majority of the highs (1014-1005 Mbs.) found in Siberia during the month disappear in this region or in the desert area of Outer Mongolia. A few are able to penetrate the area north of Lanchow, and a still smaller number travel as far south as Chengtu. While the pressure field over China is extremely flat at this time of year, a semi-permanent closed high of 1005-1011 millibars remains over the Chengtu Basin most of the month. This high occasionally moves out into east China and disappears. In July, the number of highs that can be found over east and northeast China, or the Eastern Sea is practically zero. The most common pressure pattern to be found on the synoptic map is a low in the vicinity of Lanchow, or just north of Lanchow, a very weak high in the Chengtu area, and lower pressure over south and southeast China.

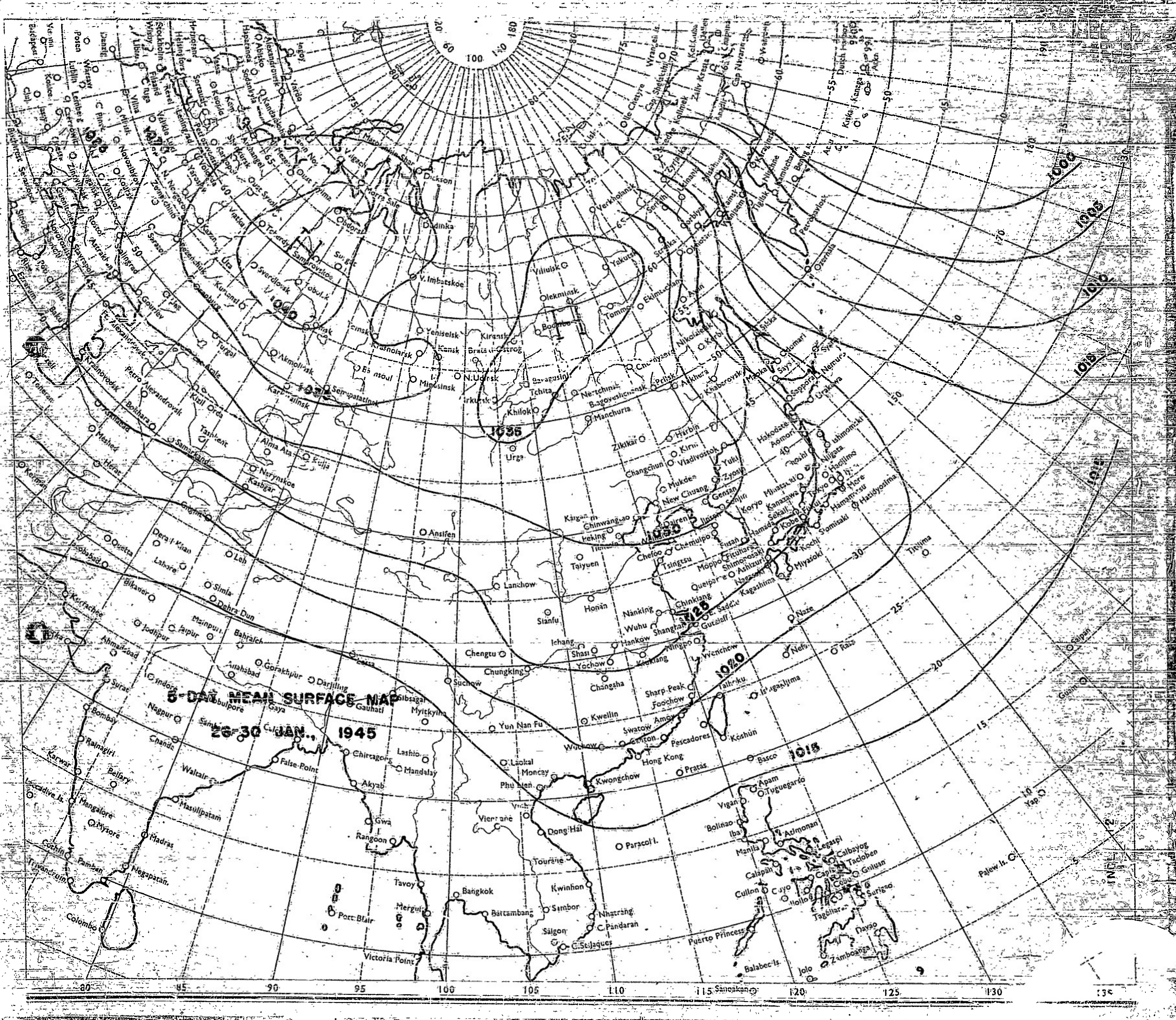
AUGUST

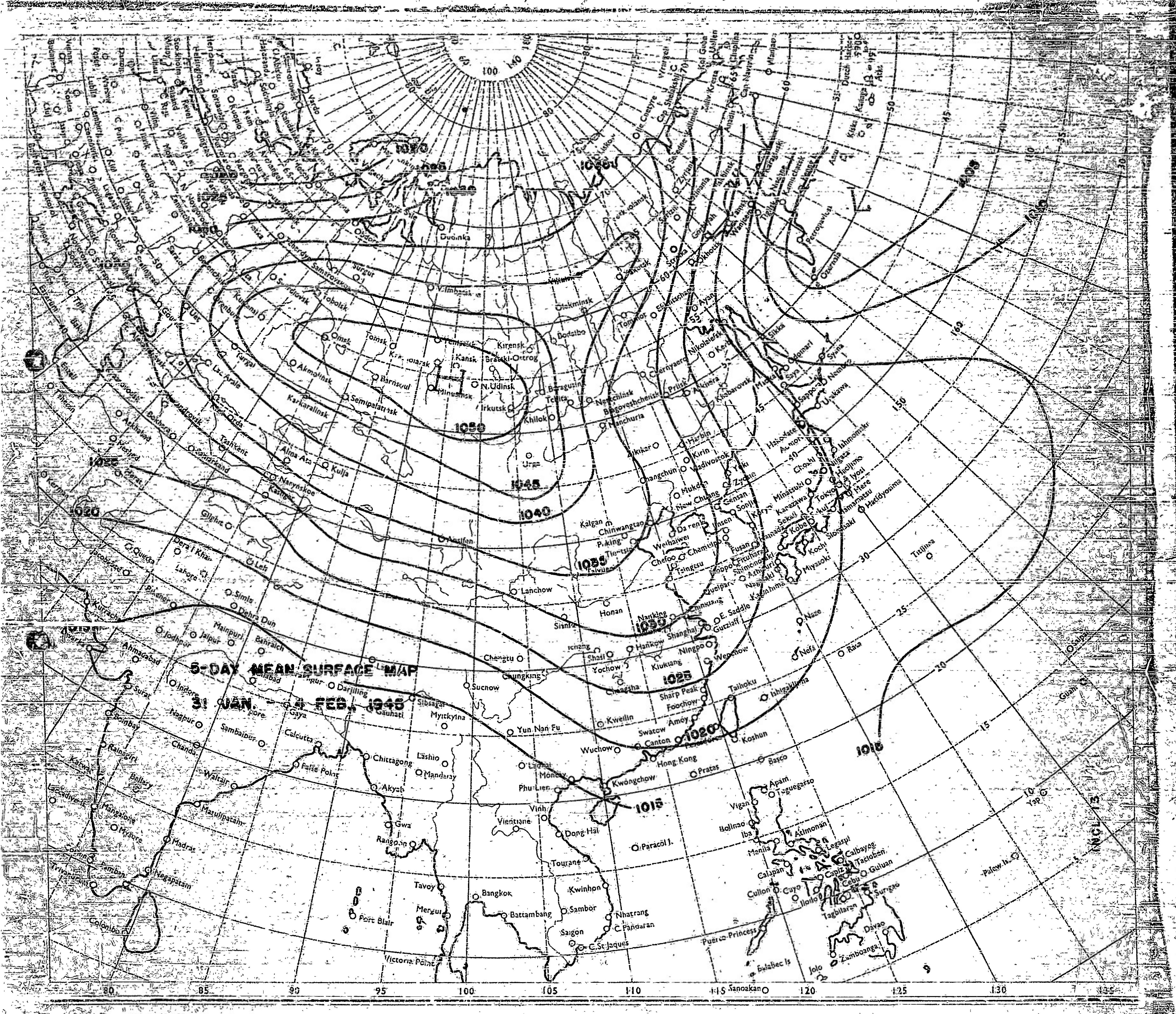
August in characterized by the fact that many more highs are able to penetrate the Chengtu area than in July. The highs move directly south into the Basin, remain there for several days, then disappear. Anticyclones in the Lake Baikal area are stronger than in July, averaging about 1017 to 1020 millibars. The cell often splits, one part moving northeast, the other moving south very rapidly until it enters the Chengtu Basin. About fifty percent of these highs that move into the Lake Baikal area are able to continue south into west China. The average pressure of the high in the Chengtu area is 1014 millibars. Very few are able to move into east China without disappearing. For some reason, a small but noticeable number of highs enter eastern Manchuria during the month of August. This rarely occurs in any other month. During the winter, a number of highs travel northeast of Manchuria, but never cross this region. In autumn and spring months, the high take a course south of Manchuria. The difference in the pressure field over all of Asia compared with the July picture, is that the highs are slightly stronger, and the Siberian high is no longer retreating westward. In September, it begins moving eastward again.

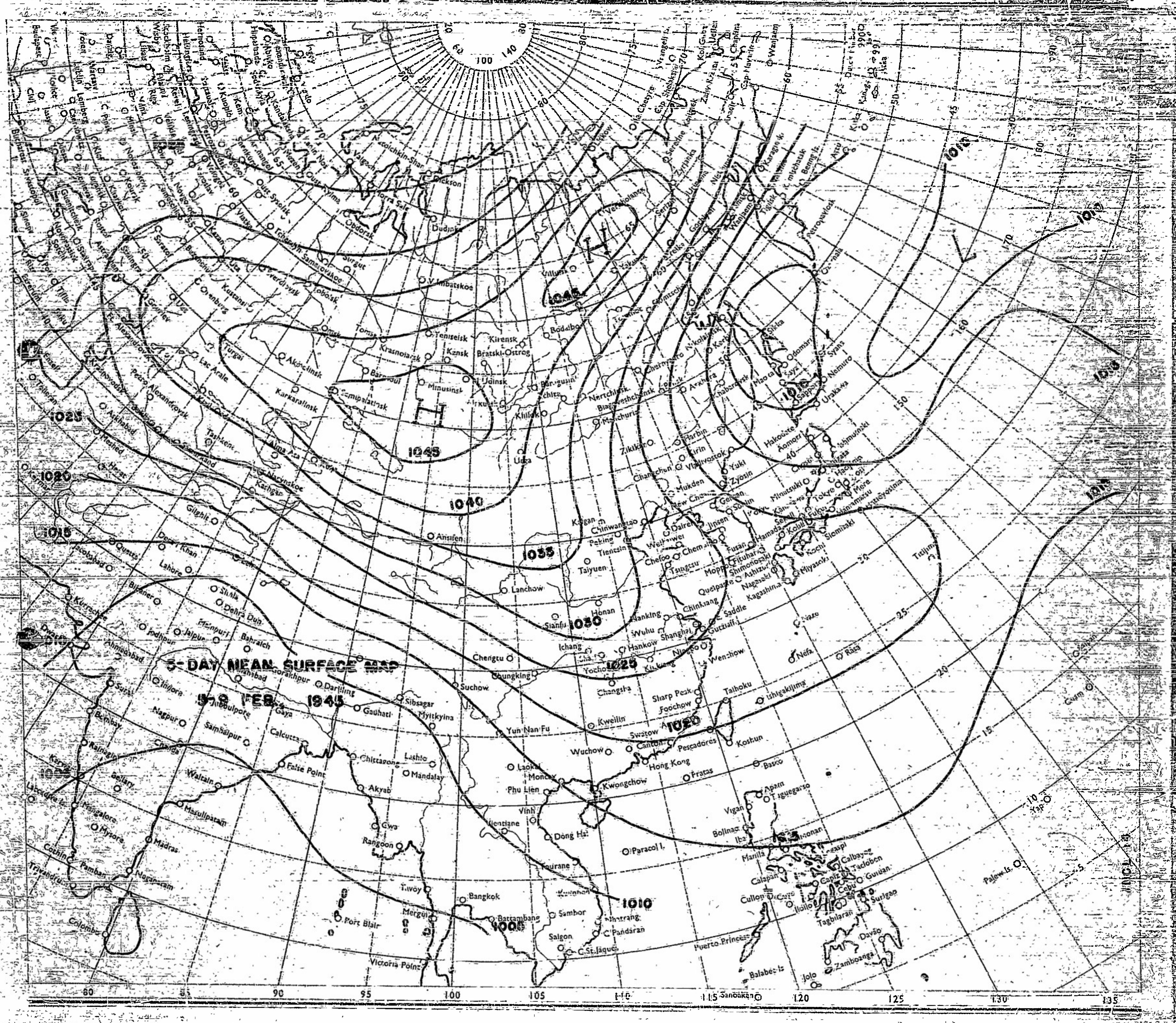
Any success a forecaster might attain in forecasting the weather conditions over various parts of China can be attributed largely to experience; and what ever is gained by reading "papers" or "studies" on China weather, is of less importance. However, the manner in which migratory anticyclones move across China is so remarkable that a knowledge of their behavior is undoubtedly one of the most useful aids the forecaster can apply to his problems. This fact justifies their study.

Examples of high tracks picked from Weather Central analyses are enclosed to illustrate how closely current situations follow "means" determined over a several year period. An attempt was made to pick tracks that were representative of the month, and the synoptic situations selected were those most frequently encountered.

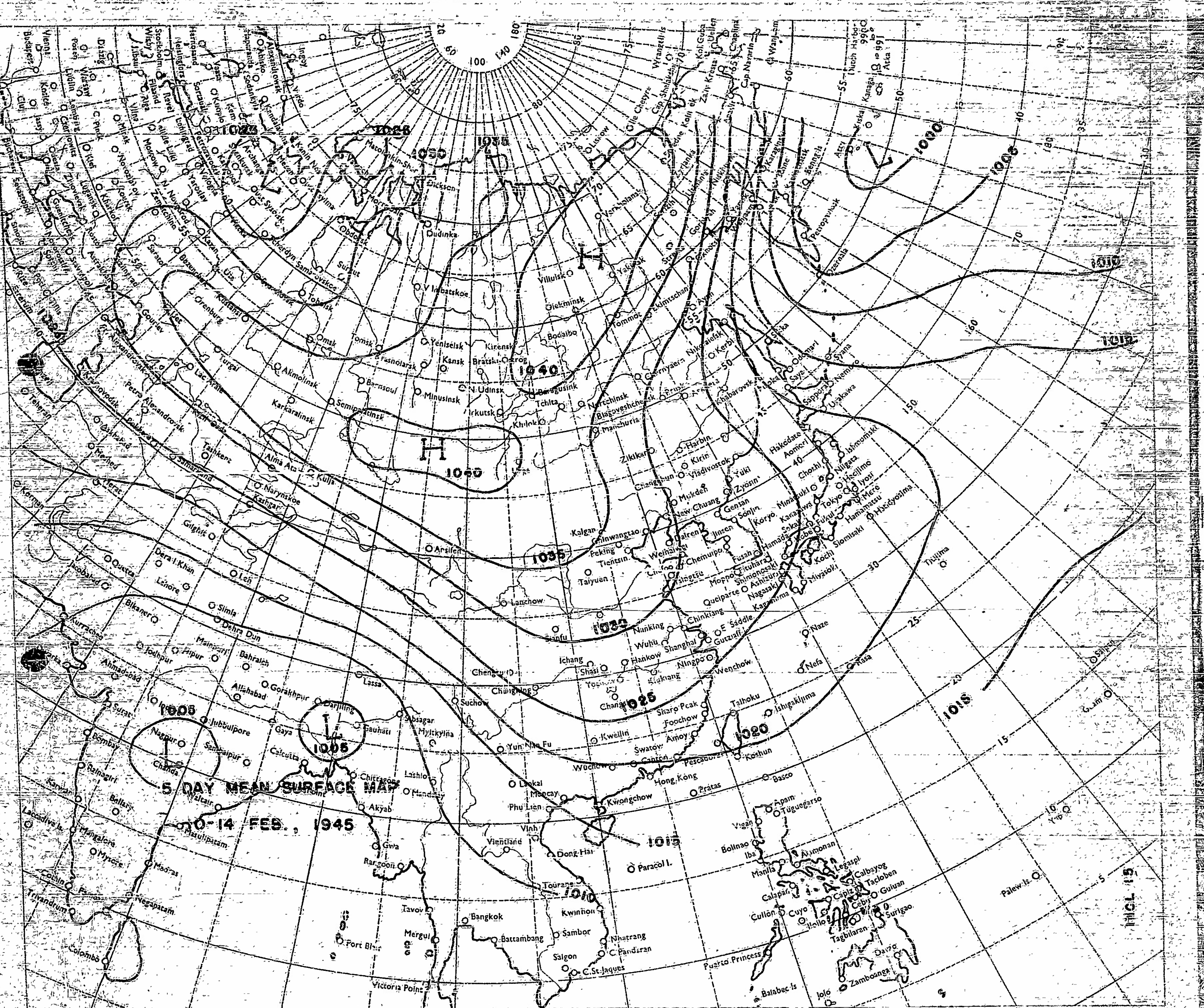

MEAN POSITION OF
SIBERIAN HIGH
1931 — 1937
MAY
SEPT.
OCT.
MAR.
APR.
NOV.
JAN.
FEB.
DEC.


5-DAY MEAN SURFACE MAP
26-30 JAN., 1945
1036
1040
1030
1025
1020
1015
1010
1005
1000


5-DAY MEAN SURFACE MAP
31 JAN. - 4 FEB. 1946

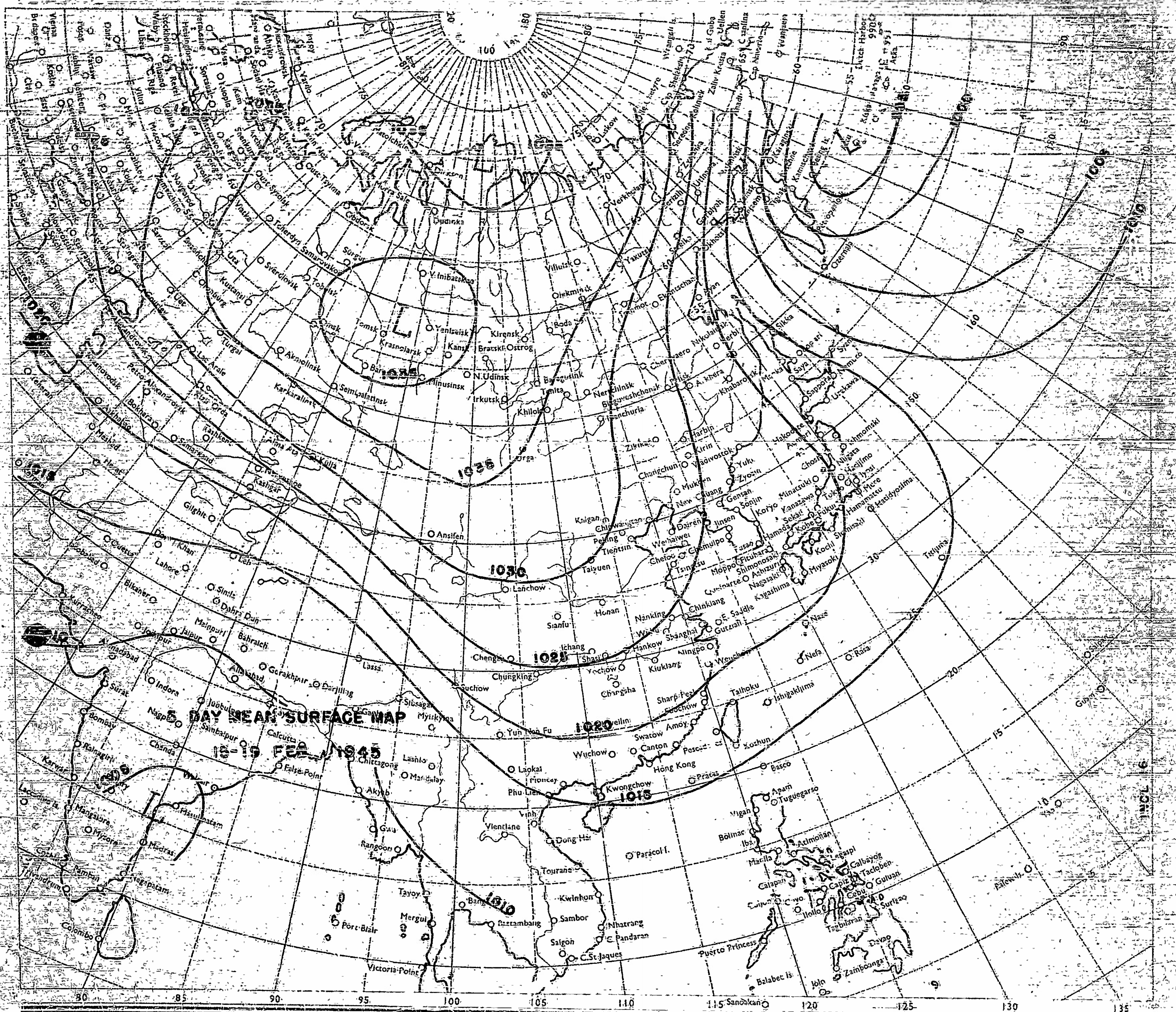


5-DAY MEAN SURFACE MAP
5-9 FEB. 1945
1045
1040
1035
1030
1025
1020
1015
1010
1005
Dickson
Dudinka
Obdorsk
Surgut
Tobolsk
Tomsk
Yeniseisk
Krasnoiarsk
Kansk
Kirensk
Bratski-Ostrog
Bodaibo
Barnaul
Semipalatinsk
Minusinsk
Karkaralinsk
Akmolinsk
Turgai
Orenburg
Kazan
Sverdlovsk
Tashkent
Alma Ata
Kashgar
Gilghit
Lahore
Simla
Dehra Dun
Bikaner
Jodhpur
Jaipur
Mainpuri
Bahraich
Gorakhpur
Darjiling
Jubbulpore
Nagpur
Sambalpur
Calcutta
Gauhati
Sibsagar
Myitkyina
Chittagong
Lashio
Mandalay
Akyab
Rangoon
Tavoy
Mergui
Port Blair
Victoria Point
Bangkok
Battambang
Saigon
Nhatrang
Tourane
Vinh
Vientiane
Dong Hoi
Paracel I.
Hong Kong
Canton
Wuchow
Kweilin
Swatow
Foochow
Taihoku
Koshun
Pescadores
Basco
Aparri
Vigan
Manila
Iloilo
Cebu
Davao
Zamboanga
Jolo
Puerto Princesa
Shanghai
Nanking
Hankow
Wuhu
Ichang
Chengtu
Chungking
Yun Nan Fu
Suchow
Lanchow
Sianfu
Honan
Taiyuen
Peking
Tientsin
Chefoo
Tsingtau
Dairen
Mukden
Changchun
Kirin
Harbin
Vladivostok
Tsitsihar
Khabarovsk
Blagoveshchensk
Chita
Irkutsk
Udinsk
Urga
Kalgan
Ansifen
Madras
Bombay
Surat
Mysore
Bangalore
Cochin
Colombo
Masulipatam
Waltair
False Point
Chanda
Bellary
Karachi
Ahmedabad
Tokyo
Kochi
Hakodate
Nemuro
Sapporo
Yakutsk
Verkhoyansk
Okhotsk
Ayan
Guam
Yap
Palew Is.

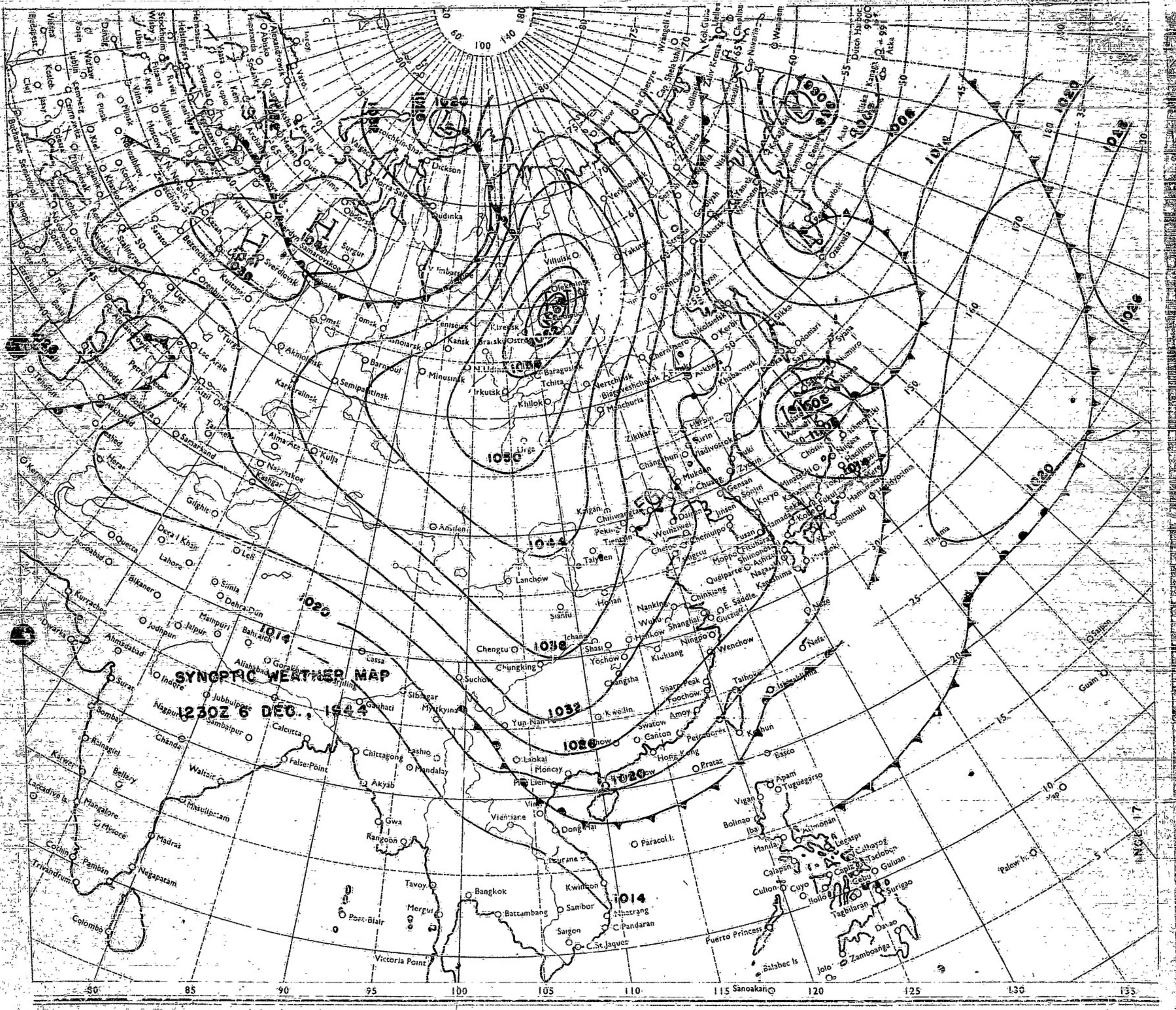


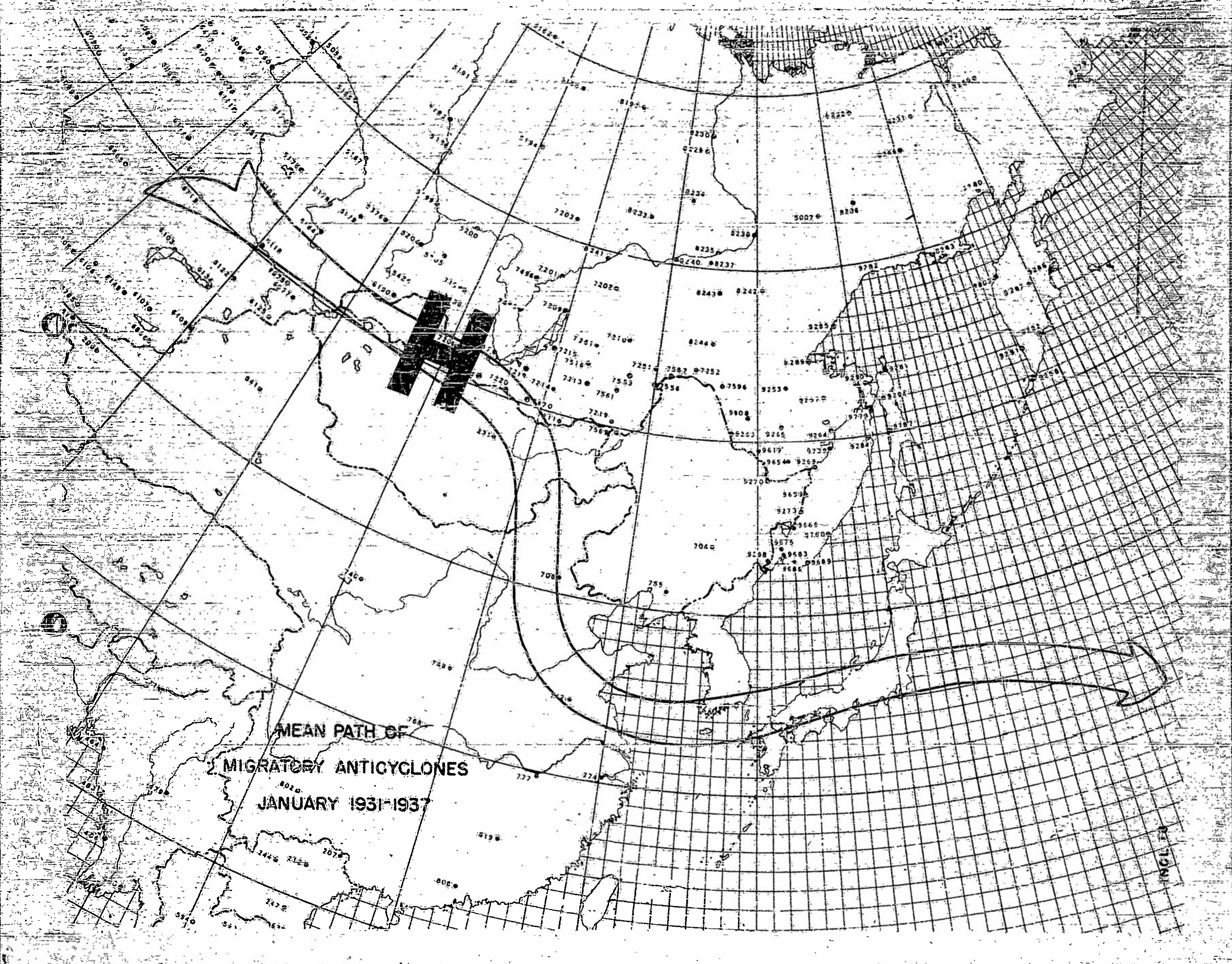
5 DAY MEAN SURFACE MAP
0-14 FEB., 1945
H
H
L
L
1060
1040
1035
1030
1025
1020
1015
1010
1005
1000

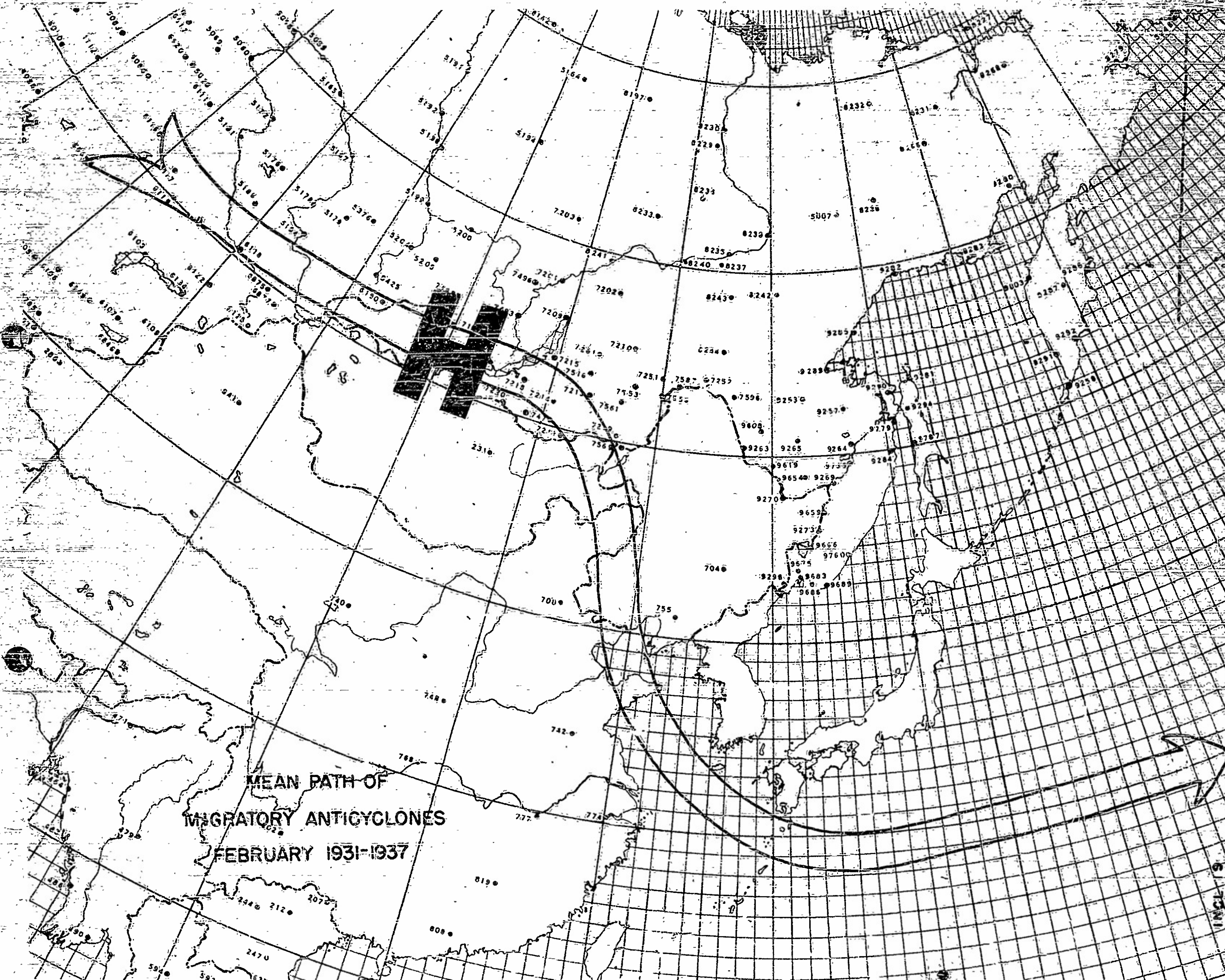
FIG. 15


5 DAY MEAN SURFACE MAP
15-19 FEB. 1945
1035
1030
1025
1020
1015
1010
1005
1000
Tomsk
Krasnoiarsk
Yeniseisk
Kansk
Kirensk
Bratski Ostrog
N. Udinsk
Minusinsk
Irkutsk
Semipalatinsk
Karkaralinsk
Akmolinsk
Tobolsk
Sverdlovsk
Kustanai
Turgai
Kzyl Orda
Tashkent
Samarkand
Bokhara
Alma Ata
Kulja
Kashgar
Gilghit
Lahore
Bikaner
Jodhpur
Jaipur
Mainpuri
Bahraich
Allahabad
Gorakhpur
Darjiling
Indore
Jubbulpore
Nagpur
Sambalpur
Calcutta
Chanda
Bombay
Ratnagiri
Karwar
Mangalore
Mysore
Madras
Masulipatam
Negapatam
Trivandrum
Colombo
Chittagong
Akyab
Mandalay
Lashio
Myitkyina
Rangoon
Tavoy
Mergui
Port Blair
Victoria Point
Bangkok
Battambang
Saigon
C. St. Jaques
C. Padaran
Nhatrang
Sambor
Kwinhon
Tourane
Dong Hoi
Vientiane
Phu-Lien
Laokai
Yun Nan Fu
Chungking
Chengtu
Lanchow
Sianfu
Honan
Ichang
Shasi
Hankow
Nanking
Shanghai
Ningpo
Wenchow
Foochow
Amoy
Swatow
Canton
Hong Kong
Kwongchow
Paracel I.
Taihoku
Koshun
Basco
Aparri
Tuguegarao
Vigan
Manila
Legaspi
Calbayog
Tacloban
Cebu
Iloilo
Surigao
Davao
Zamboanga
Jolo
Puerto Princess
Balabac Is.
Sandakan
Peiping
Tientsin
Taiyuen
Kalgan
Dairen
Chemulpo
Fusan
Gensan
Mukden
Harbin
Kirin
Vladivostok
Changchun
Khabarovsk
Nikolaievsk
Nagasaki
Kagoshima
Miyasaki
Kochi
Kobe
Kanazawa
Niigata
Hakodate
Sapporo
Tokyo
Hamamatsu
Hachijojima
Naze
Nafa
Yakutsk
Olekminsk
Vilhuisk
Verkhoyansk
Okhotsk
Petropavlovsk
Dudinka
Obdorsk
Archangel
Moscow
Kazan
Ufa
Guriev
Baku
Teheran
Meshed
Herat
Quetta
Leh
Lassa
Ansifen
Khilok
Urga
Nerchinsk
Blagoveshchensk
Manchuria
80
85
90
95
100
105
110
115
120
125
130
135

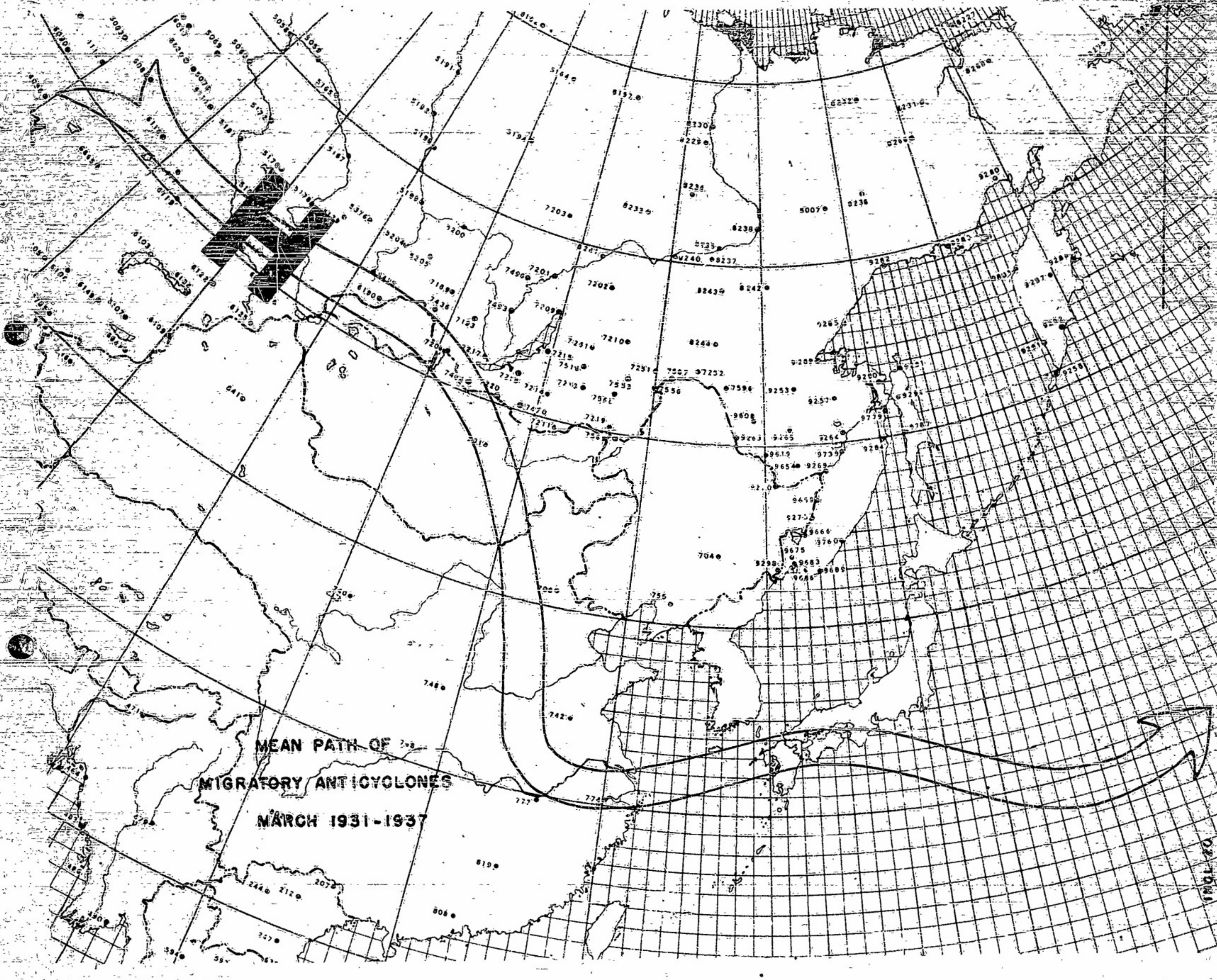
INCL. 6

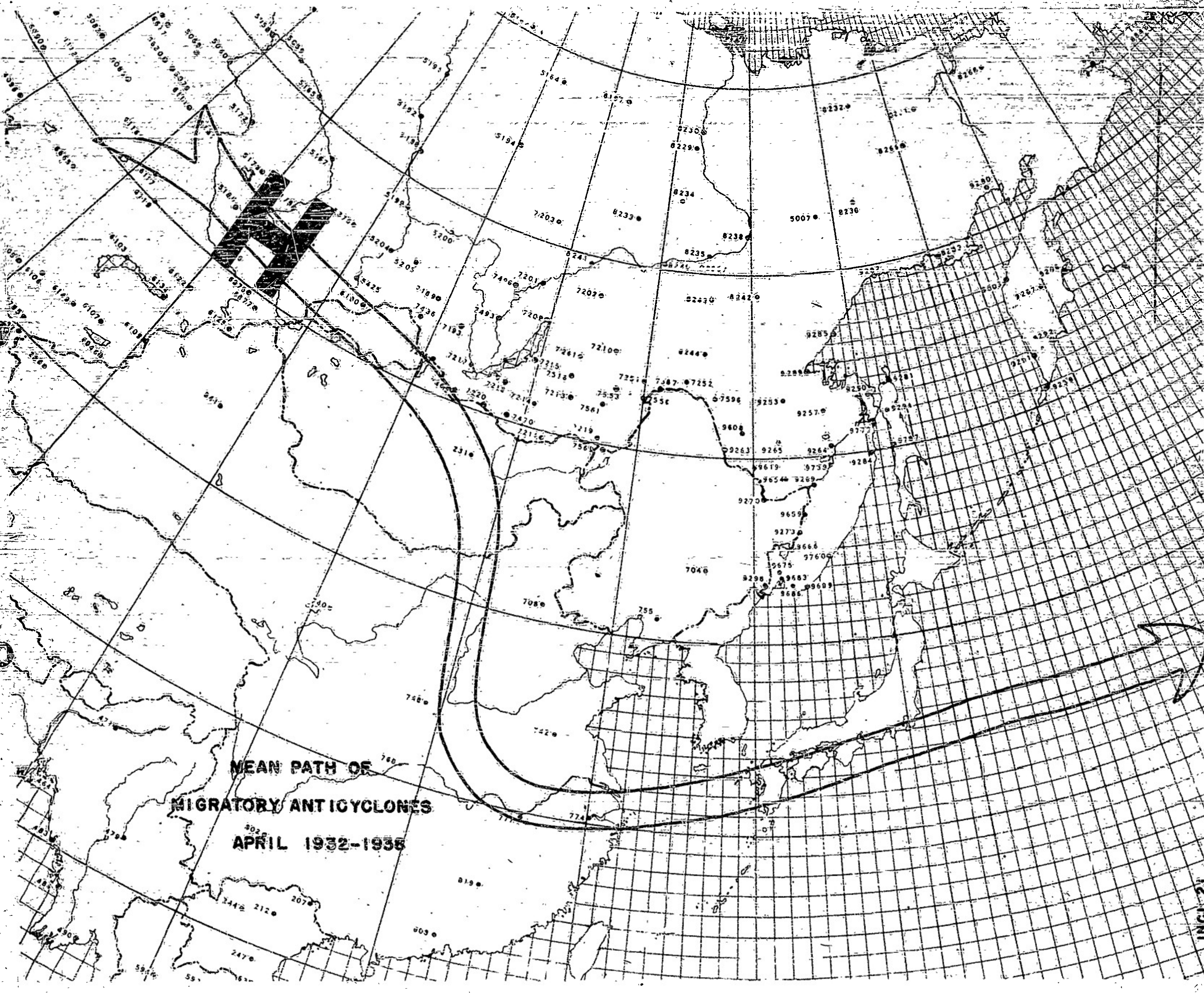

SYNOPTIC WEATHER MAP
1230Z 6 DEC., 1944
1050
1044
1038
1032
1026
1020
1014
Calcutta
Bangkok
Shanghai
Hong Kong
Manila
Irkutsk
Lanchow
Chengtu
Chungking
Mukden
Harbin
Saigon
Colombo
Madras
Bombay
Mandalay
Rangoon
Guam
Saipan


MEAN PATH OF
MIGRATORY ANTICYCLONES
JANUARY 1931-1937

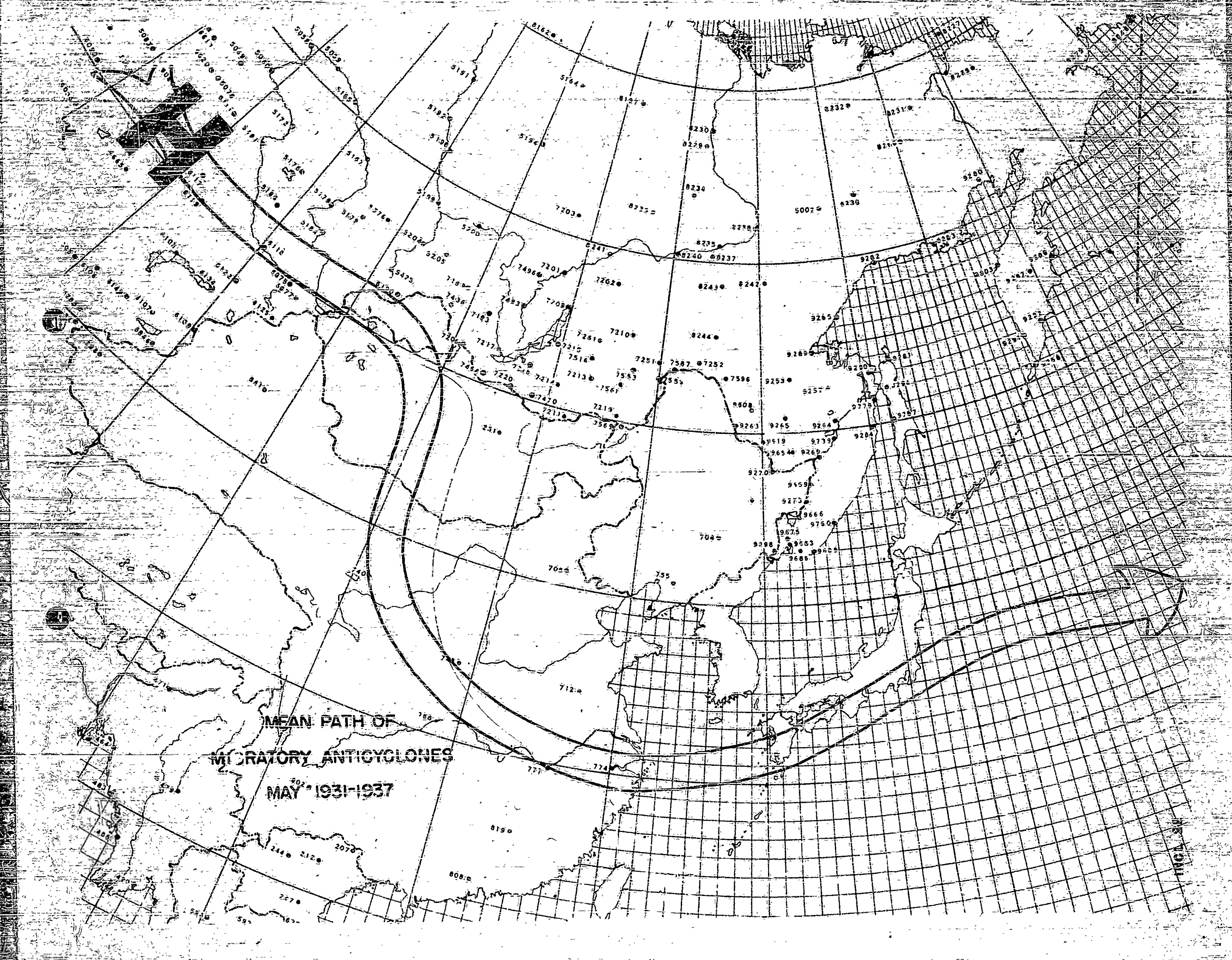


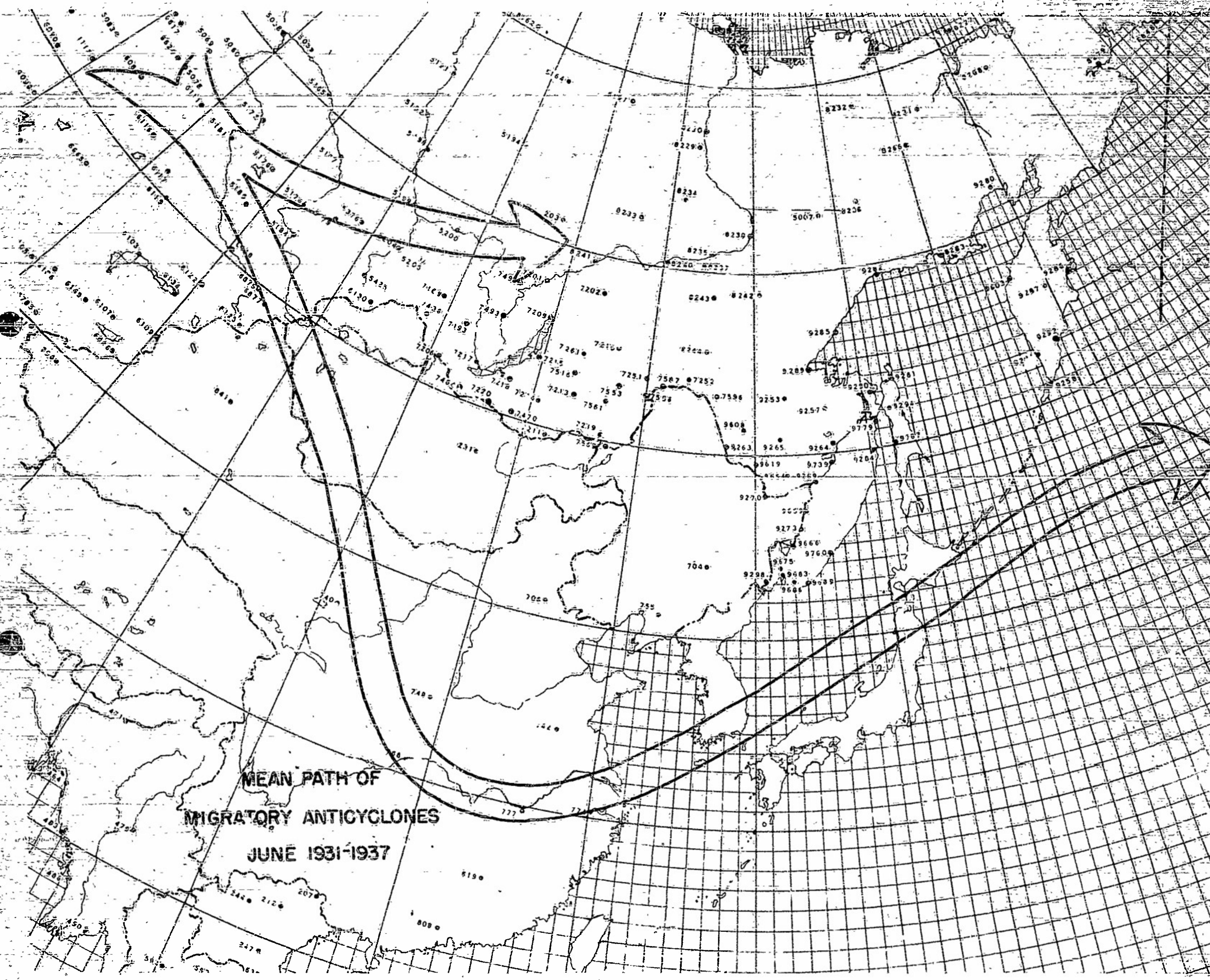
INCL 9


MEAN PATH OF
MIGRATORY ANTICYCLONES
MARCH 1931-1937

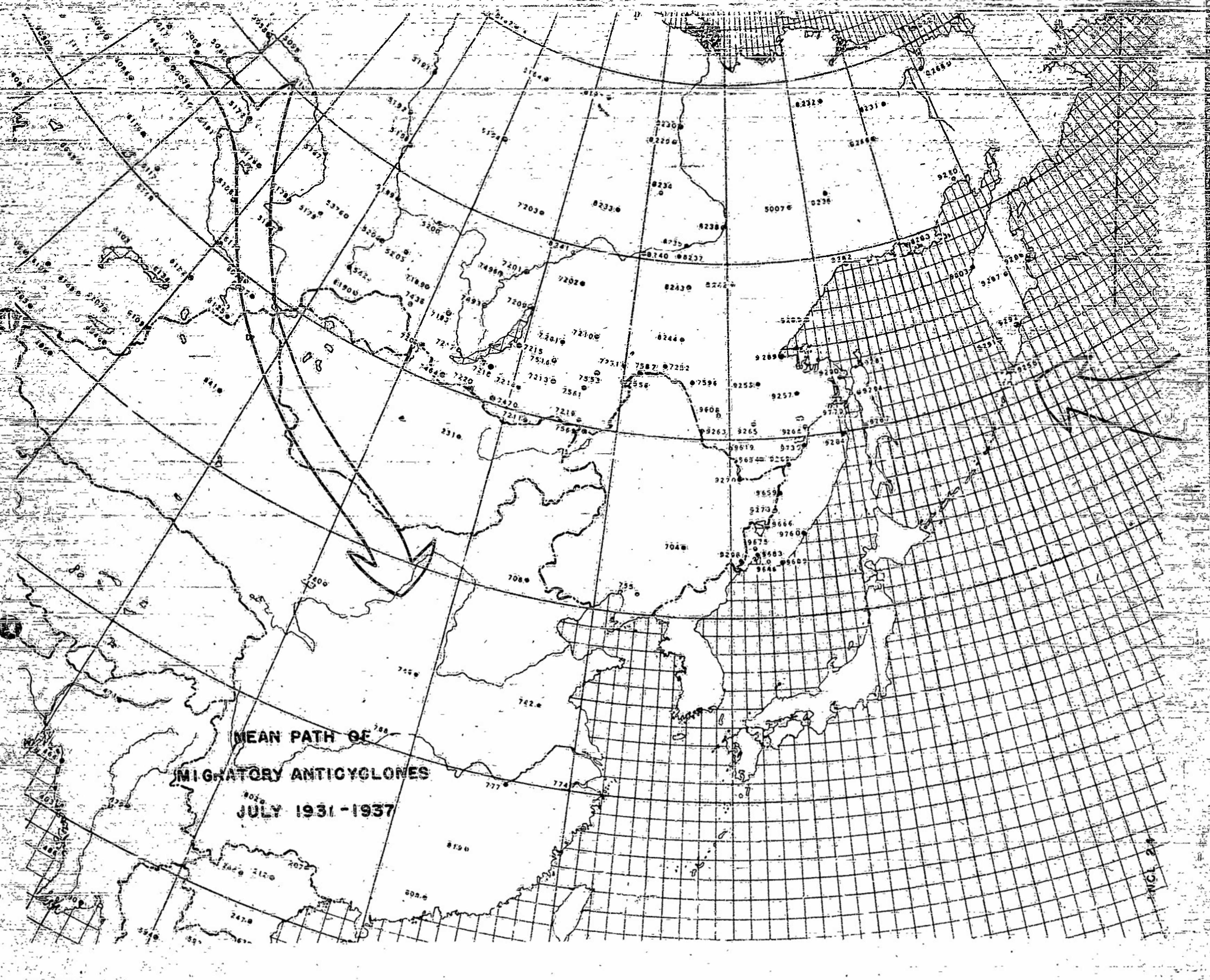


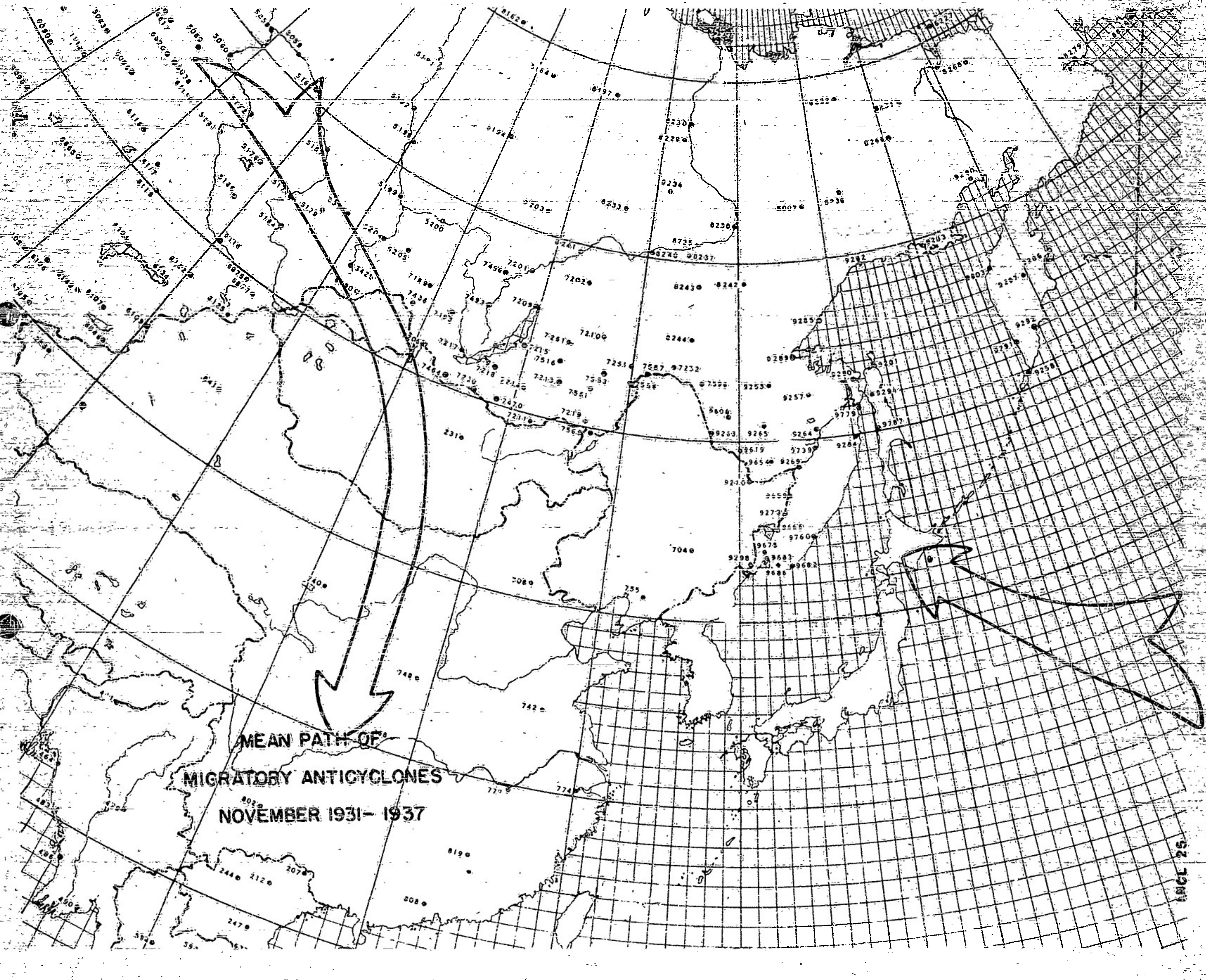
INCL 2

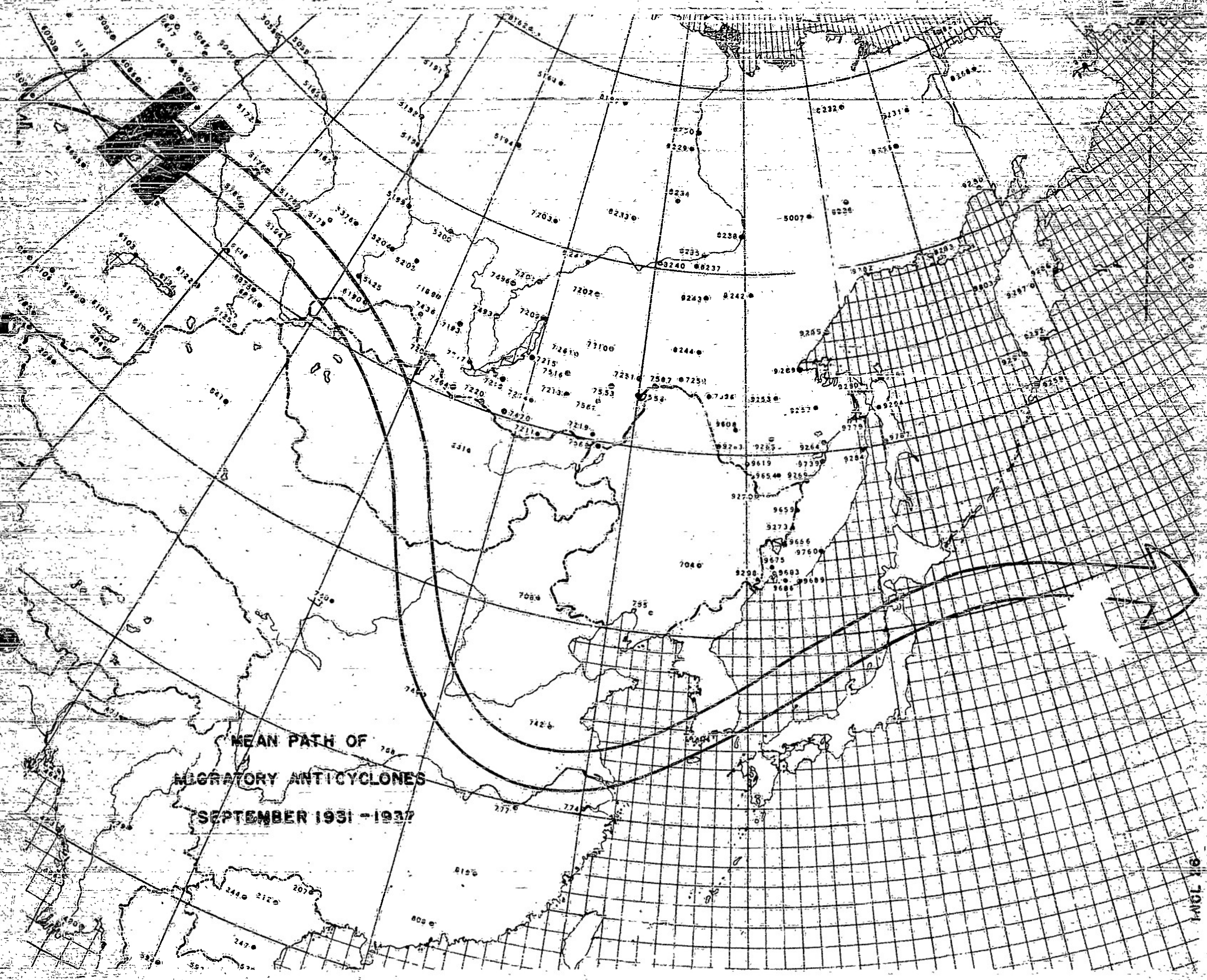

MEAN PATH OF
MIGRATORY ANTICYCLONES
MAY 1931-1937

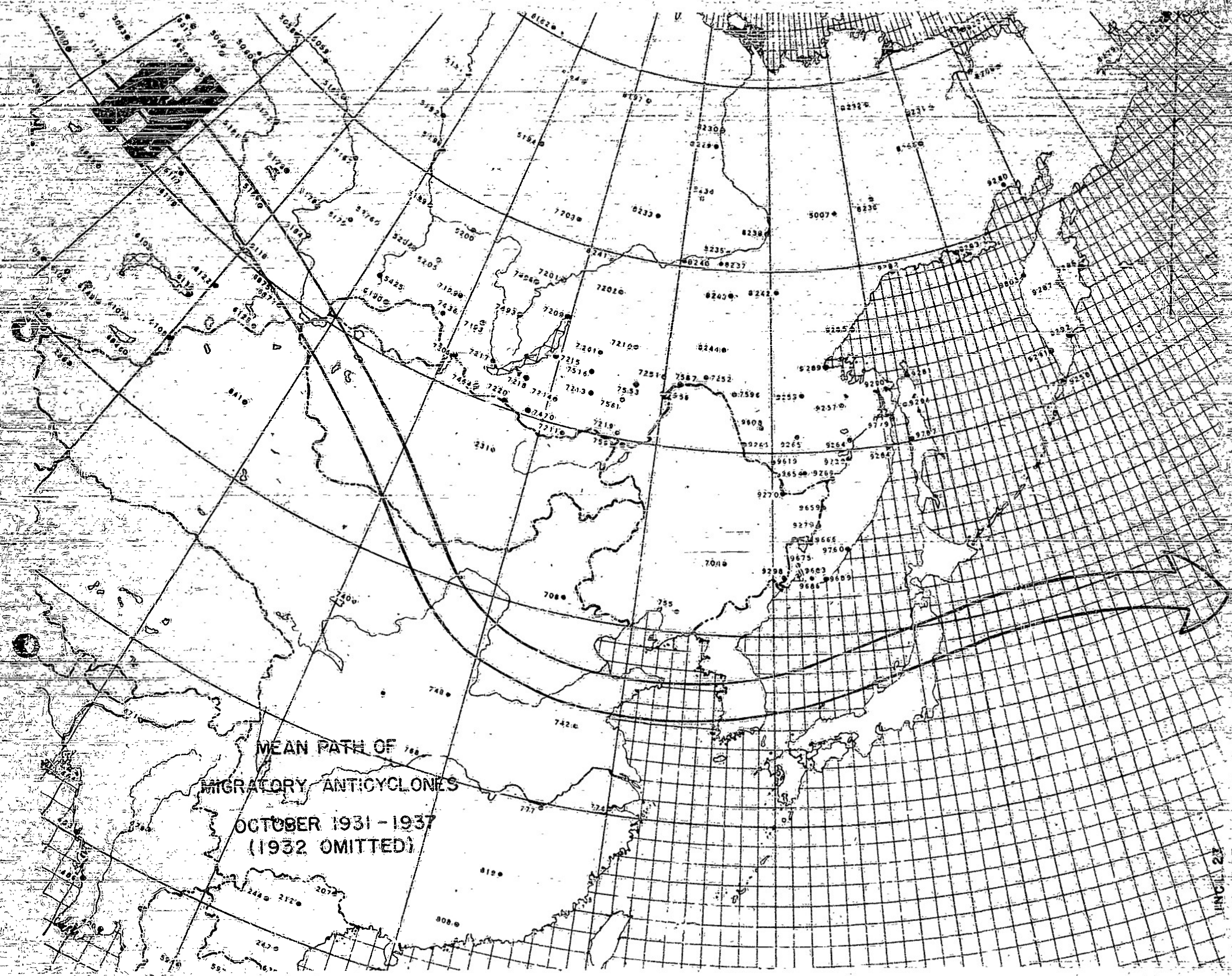


INCL 23

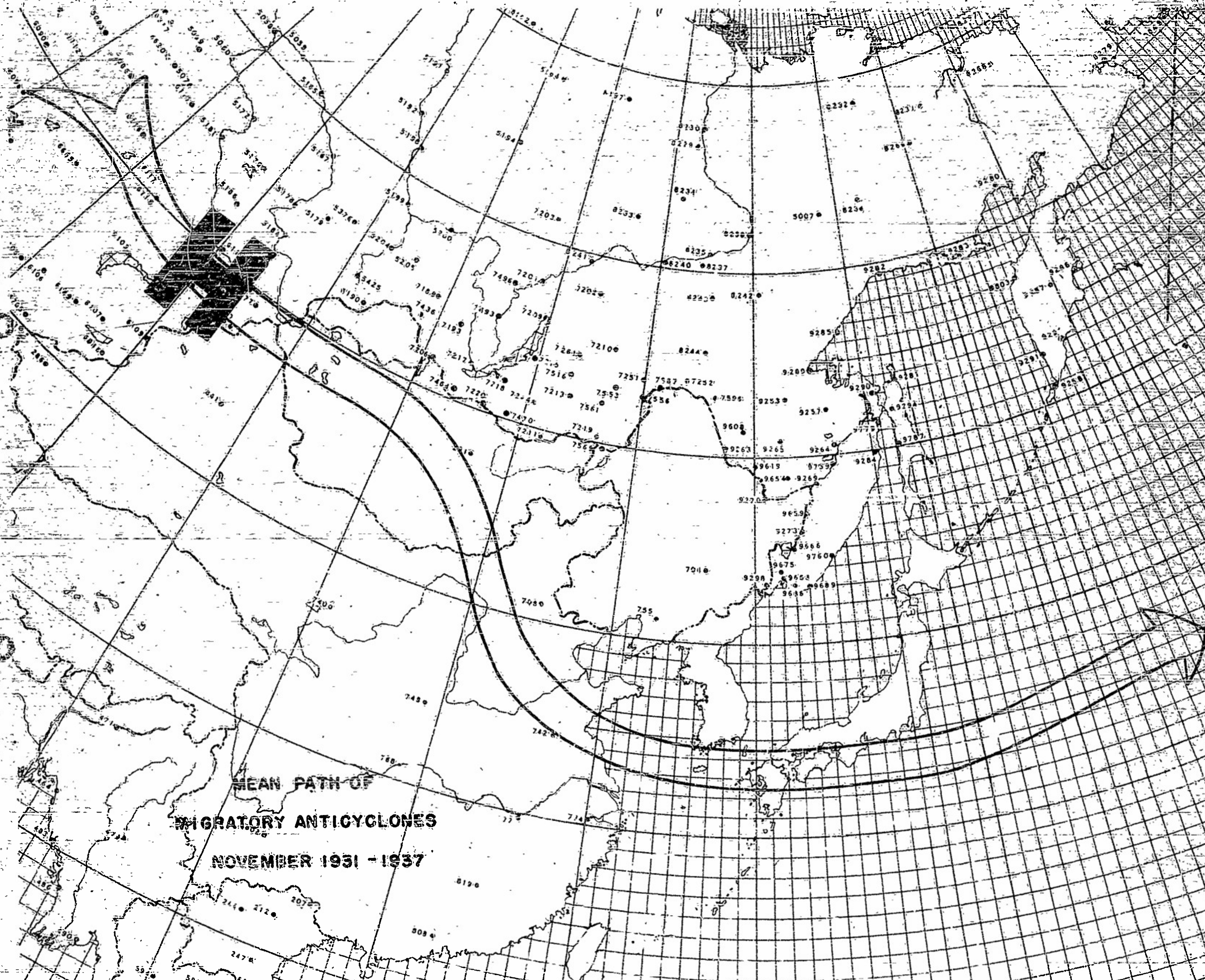

MEAN PATH OF
MIGRATORY ANTICYCLONES
JULY 1931-1937


MEAN PATH OF
MIGRATORY ANTICYCLONES
NOVEMBER 1931- 1937
ANCL 25

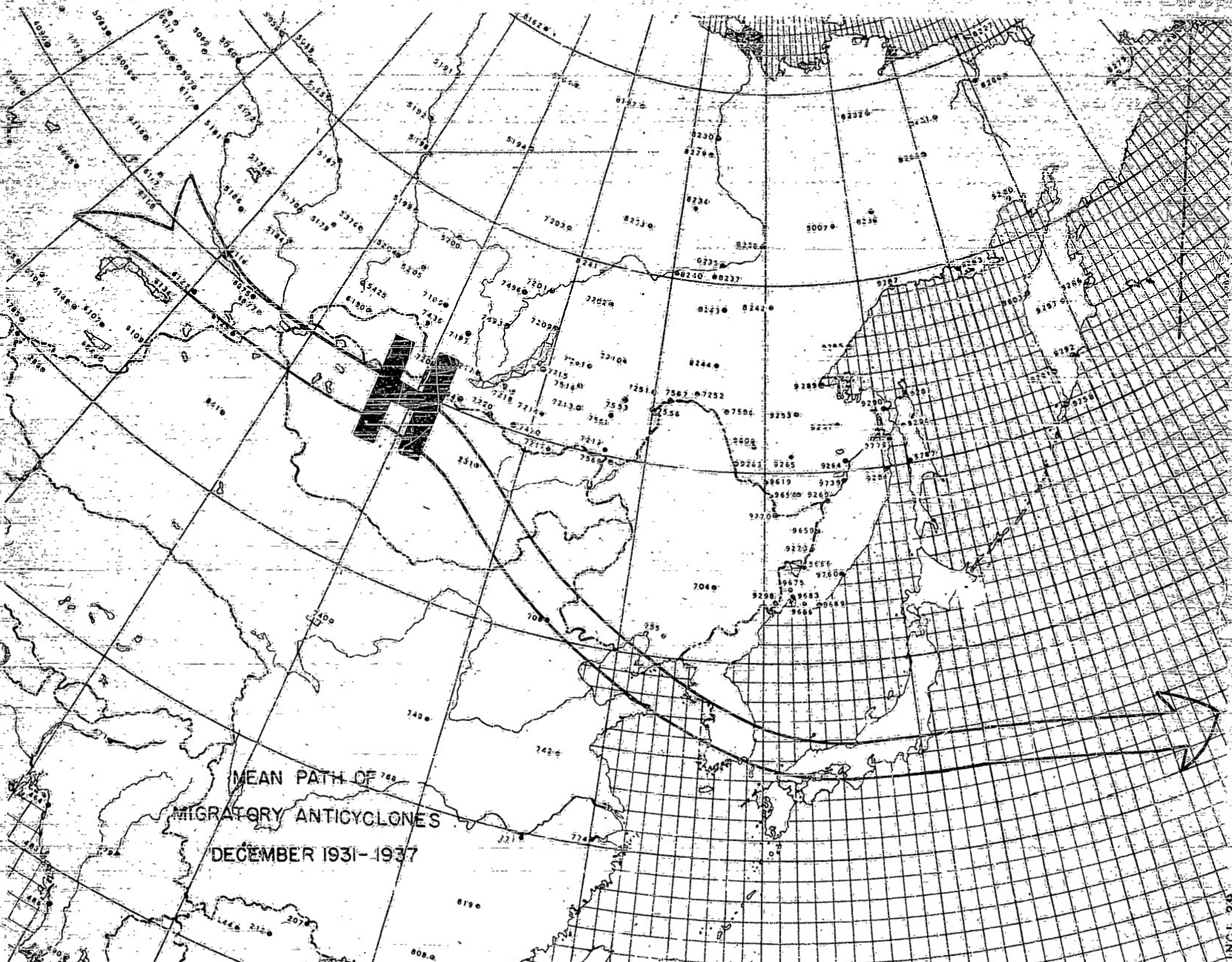

MEAN PATH OF
MIGRATORY ANTICYCLONES
SEPTEMBER 1931 - 1937
HCL 26


MEAN PATH OF
MIGRATORY ANTICYCLONES
OCTOBER 1931 - 1937
(1932 OMITTED)

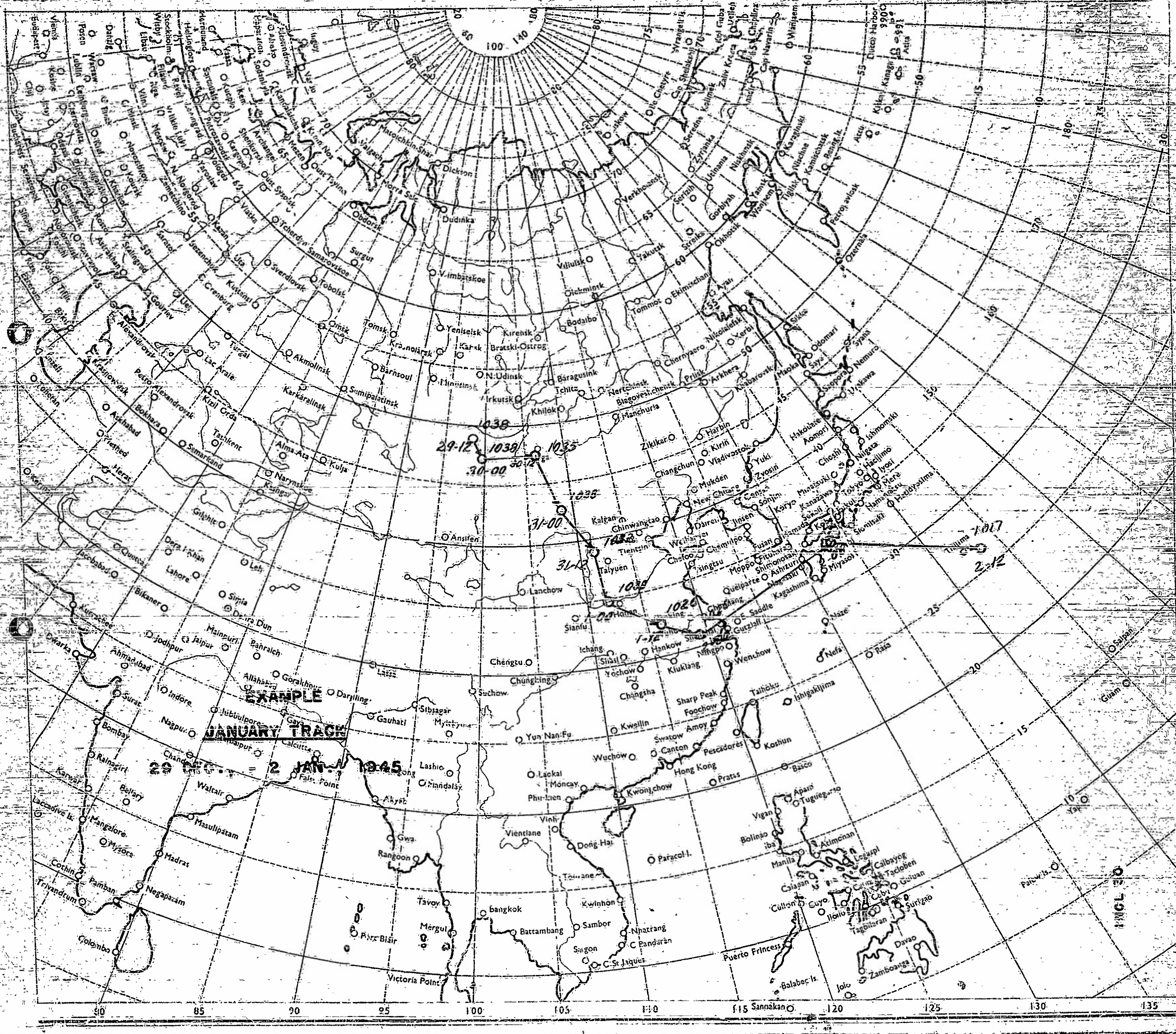
INCL. 27



INCL 28



INCL 29


EXAMPLE
JANUARY TRACK
29 DEC. - 2 JAN. 1945
1038
29-12
30-00
1035
31-00
1032
31-12
1030
1026
1-12
1017
2-12
Dickson
Dudinka
Verkhoyansk
Yakutsk
Okhotsk
Olekminsk
Vilyuisk
Surgut
Obdorsk
Tobolsk
Sverdlovsk
Omsk
Tomsk
Yeniseisk
Kirensk
Bodaibo
Krasnoiarsk
Barnaoul
Irkutsk
Khilok
Semipalatinsk
Akmolinsk
Karkaralinsk
Alma Ata
Kulja
Tashkent
Samarkand
Bokhara
Kizil Orda
Ashkhabad
Meshed
Herat
Gilghit
Leh
Lahore
Quetta
Jacobabad
Dera I Khan
Simla
Dehra Dun
Bikaner
Karachee
Dwarka
Ahmadabad
Jodhpur
Jaipur
Mainpuri
Bahraich
Allahabad
Gorakhpur
Darjiling
Surat
Indore
Jubbulpore
Gaya
Bombay
Nagpur
Calcutta
Ratnagiri
Karwar
Bellary
Waltair
False Point
Mangalore
Mysore
Masulipatam
Madras
Cochin
Pamban
Negapatam
Trivandrum
Colombo
Port Blair
Akyab
Mandalay
Lashio
Gauhati
Sibsagar
Myitkyina
Gwa
Rangoon
Tavoy
Mergui
Victoria Point
Bangkok
Battambang
Saigon
C. St Jaques
Sambor
Kwinhon
Nhatrang
C. Padaran
Tourane
Dong Hai
Vientiane
Vinh
Phu-lien
Moncay
Lackai
Yun Nan Fu
Suchow
Chungking
Chengtu
Lanchow
Ansifen
Lhasa
Sianfu
Honan
Taiyuen
Kalgan
Chinwangtao
Tientsin
Weihaiwei
Chefoo
Tsingtsu
Ichang
Shasi
Hankow
Yochow
Changsha
Kiukiang
Kweilin
Wuchow
Canton
Hong Kong
Swatow
Amoy
Foochow
Sharp Peak
Wenchow
Ningpo
Gutzlaff I.
Kwongchow
Paracel I.
Pescadores
Koshun
Taihoku
Ishigakijima
Naze
Nafa
Basco
Aparri
Tuguegarao
Vigan
Bolinao
Iba
Manila
Atimonan
Legaspi
Calbayog
Tacloban
Calapan
Cuyo
Culion
Iloilo
Cebu
Tagbilaran
Surigao
Guiuan
Puerto Princess
Davao
Zamboanga
Jolo
Balabac Is.
Sannakan
Palau Is.
Yap
Guam
Saipan
Rasa
Harbin
Kirin
Vladivostok
Mukden
Changchun
New Chwang
Dairen
Jinsen
Chemulpo
Fusan
Moppo
Quelparte
Nagasaki
Kagoshima
Shimonoseki
Miyasaki
Hachijima
Tokyo
Niigata
Choshi
Hakodate
Aomori
Sapporo
Nemuro
Urakawa
Odomari
Maoka
Sikka
Khabarovsk
Nikolaievsk
Blagoveshchensk
Manchuria
Zikikar
Kerbi
Arkhara
Ayan
Ekimtchan
Tommot
Petropavlovsk
Kamtschatsk
Gorbiyah
Nizhne Kolymsk
Sredne Kolymsk
Anadyr
Attu
Kiska
Dutch Harbor
Vologda
Archangel
Kargopol
Leningrad
Moscow
Kazan
Ufa
Saratov
Stalingrad
Astrakhan
Gouriev
Orenburg
Alexandrovsk
Krasnovodsk
Baku
Tiflis
Batum
Erzerum
Sevastopol
Odessa
Kiev
Minsk
Vilno
Riga
Libau
Memel
Danzig
Posen
Warsaw
Lublin
Lemberg
Budapest
Vienna
Cluj
Bucharest
Stockholm
Helsingfors
Visby
Wiborg
Petrozavodsk
Kotlas
Mezen
Kanin Nos
Ust Tsylma
Ust Sysolsk
Viatka
Jarensk
Matotchkin Shar
Vaigach
Pechora
Turgai
Lac Arale
Petro Alexandrovsk
Aral
Narynskoe
Kashgar
Cap Navarin
Cap Chaplina
Cap Shelagskii
Ile Wrangel
Ile Chetyre
Zaliv Kresta
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140
180
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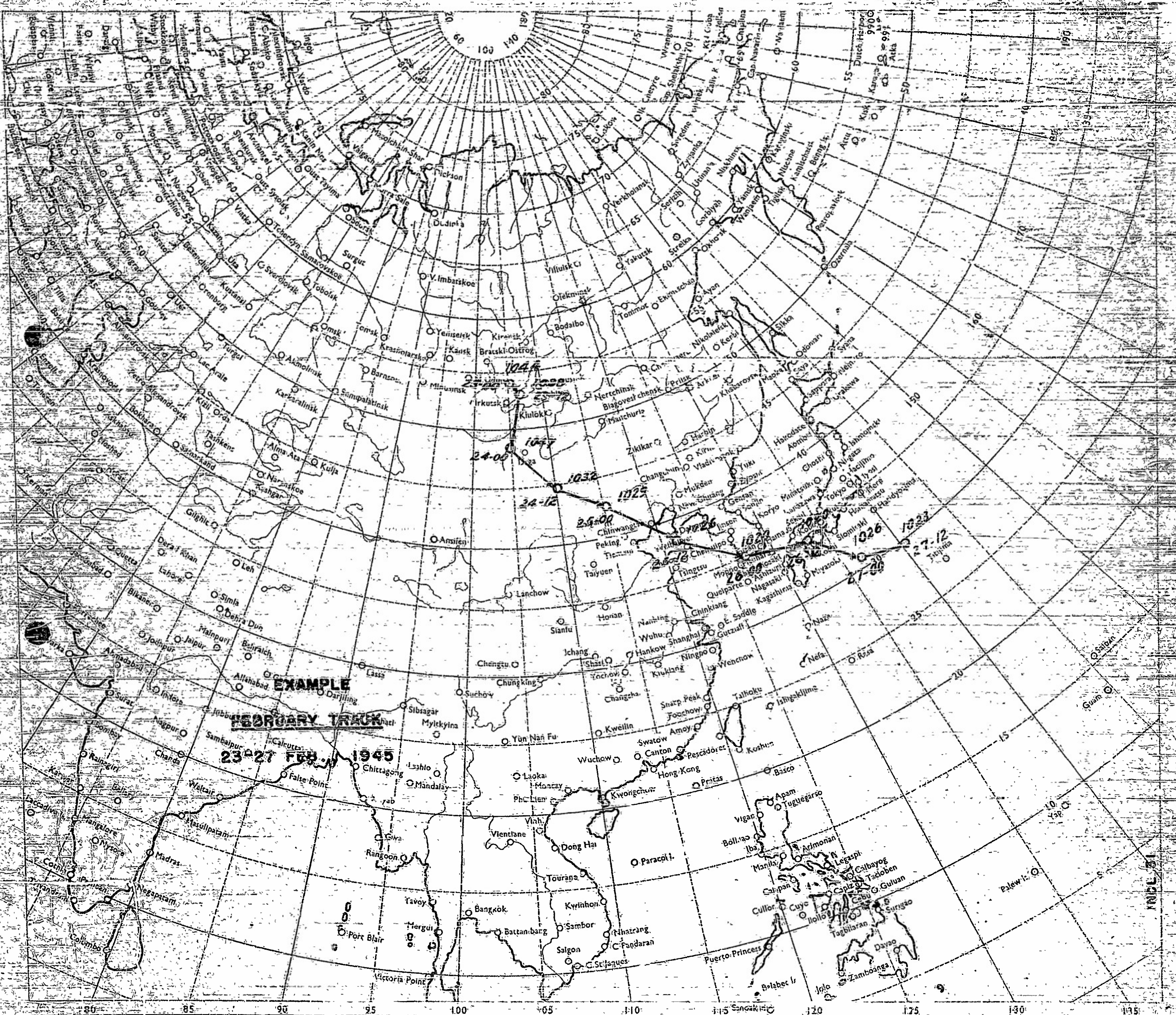
EXAMPLE
FEBRUARY TRACK
23-27 FEB. 1945
24-00
24-12
25-00
1032
1025
Irkutsk
Peking
Tientsin
Taiyuen
Harbin
Mukden
Tokyo
Shanghai
Hankow
Chungking
Chengtu
Lanchow
Sianfu
Kweilin
Canton
Hong Kong
Amoy
Foochow
Swatow
Ningpo
Wenchow
Taihoku
Manila
Legaspi
Davao
Zamboanga
Surigao
Iloilo
Cebu
Tacloban
Puerto Princesa
Vigan
Aparri
Saigon
Bangkok
Rangoon
Mandalay
Chittagong
Calcutta
Myitkyina
Madras
Bombay
Colombo
Negapatam
Masulipatam
Nagpur
Jaipur
Jodhpur
Simla
Lahore
Leh
Gilgit
Kashgar
Alma Ata
Kulja
Tashkent
Samarkand
Bokhara
Omsk
Tomsk
Tobolsk
Sverdlovsk
Kazan
Yakutsk
Verkhoyansk
Okhotsk
Ayan
Nikolaevsk
Khabarovsk
Blagoveshchensk
Vladivostok
Dudinka
Surgut
Barnaul
Semipalatinsk
Karaganda
Akmolinsk
Minusinsk
Krasnoiarsk
Kansk
Yeniseisk
Kirensk
Bodaibo
Olekminsk
Vilyuisk
Pickson
Nagasaki
Kagoshima
Miyazaki
Shimonoseki
Niigata
Hakodate
Sapporo
Guam
Palew I.
Paracel I.
Tourane
Hue
Vientiane
Port Blair
Victoria Point
Mergui
Tavoy
Dutch Harbor
Attu
Kiska
Petropavlovsk
Ozernaia
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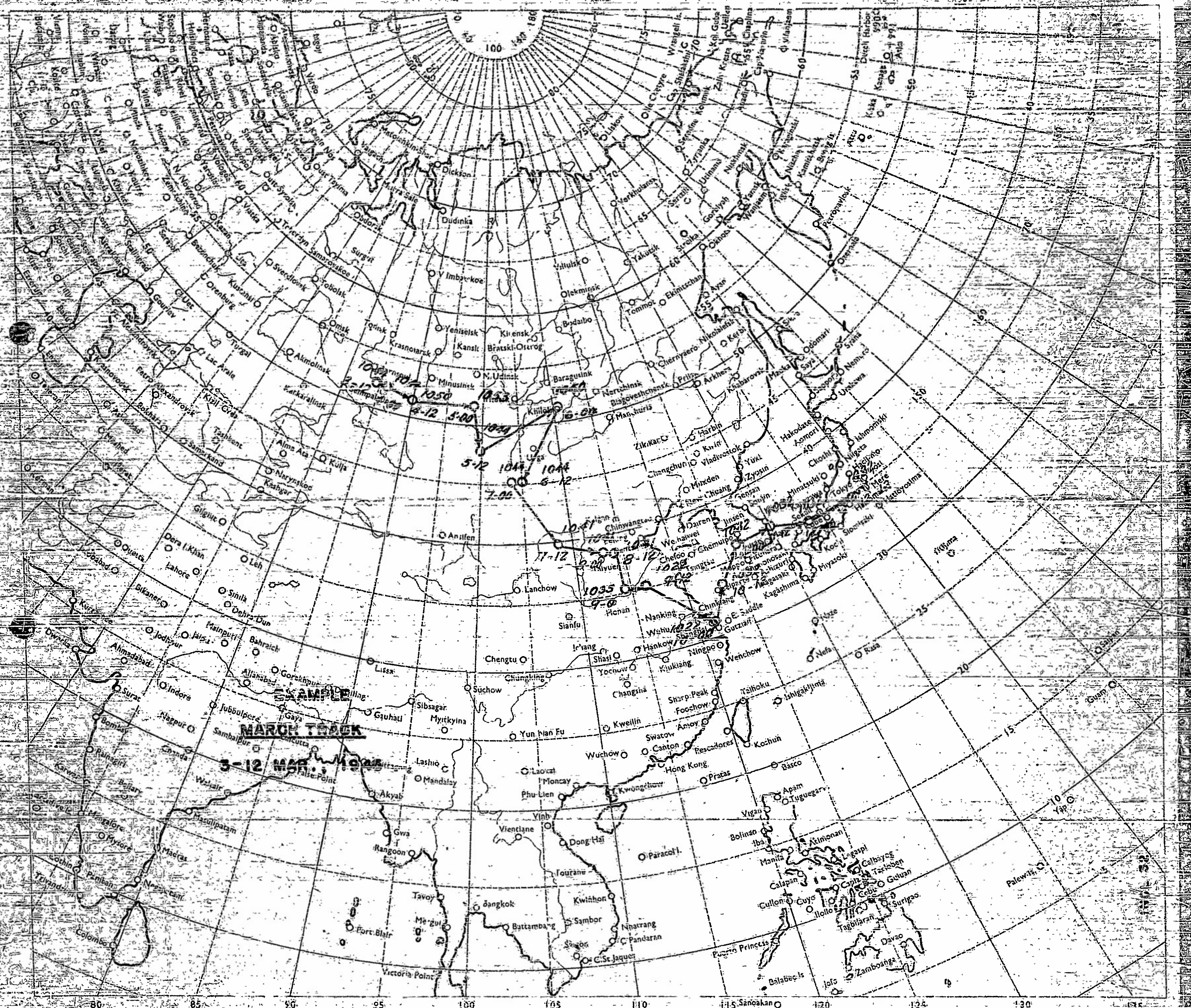

EXAMPLE
MARCH TRACK
3-12 MAR.
Dickson
Dudinka
Yakutsk
Olekminsk
Omsk
Tobolsk
Sverdlovsk
Orenburg
Akmolinsk
Krasnoiarsk
Kansk
Minusinsk
Barguzinsk
Nertchinsk
Blagoveshchensk
Khabarovsk
Harbin
Vladivostok
Changchun
Mukden
Dairen
Chemulpo
Chinwangtao
Chefoo
Taiyuen
Lanchow
Sianfu
Honan
Nanking
Wuhu
Shanghai
Hankow
Ichang
Ningpo
Wenchow
Kiukiang
Changsha
Chengtu
Chungking
Suchow
Foochow
Amoy
Swatow
Canton
Hong Kong
Wuchow
Kweilin
Yun Nan Fu
Pescadores
Kochun
Basco
Pratas
Kwongchow
Phu-Lien
Vinh
Vientiane
Dong Hai
Paracel I.
Tourane
Kwinhon
Nhatrang
Sambor
Battambang
Bangkok
Saigon
C. St. Jaques
Victoria Point
Mergui
Tavoy
Rangoon
Gwa
Akyab
Mandalay
Lashio
Myitkyina
Sibsagar
Gauhati
Calcutta
False Point
Gaya
Gorakhpur
Lissa
Allahabad
Bahraich
Mainpuri
Jubbulpore
Sambalpur
Nagpur
Indore
Jodhpur
Ahmadabad
Surat
Bombay
Ratnagiri
Karwar
Mangalore
Mysore
Madras
Masulipatam
Walsair
Negapatam
Colombo
Trivandrum
Cochin
Lahore
Leh
Simla
Dehra Dun
Bikaner
Quetta
Dera I. Khan
Gilgit
Kashgar
Naryn
Alma Ata
Kulja
Tashkent
Samarkand
Bokhara
Lac Aral
Kazan
Viatka
Gouriev
Stalingrad
Hakodate
Aomori
Niigata
Tokyo
Miyazaki
Kagoshima
Nagasaki
Chinkiang
Taihoku
Ishigakijima
Naze
Guam
Yap
Palew Is.
Manila
Legaspi
Cebu
Iloilo
Davao
Zamboanga
Jolo
Puerto Princesa
Balabac Is.
Sandakan
Aparri
Tuguegarao
Vigan
Bolinao
Iba
Kiska
Attu
Petropavlovsk
Okhotsk
Nikolaievsk
Ayan
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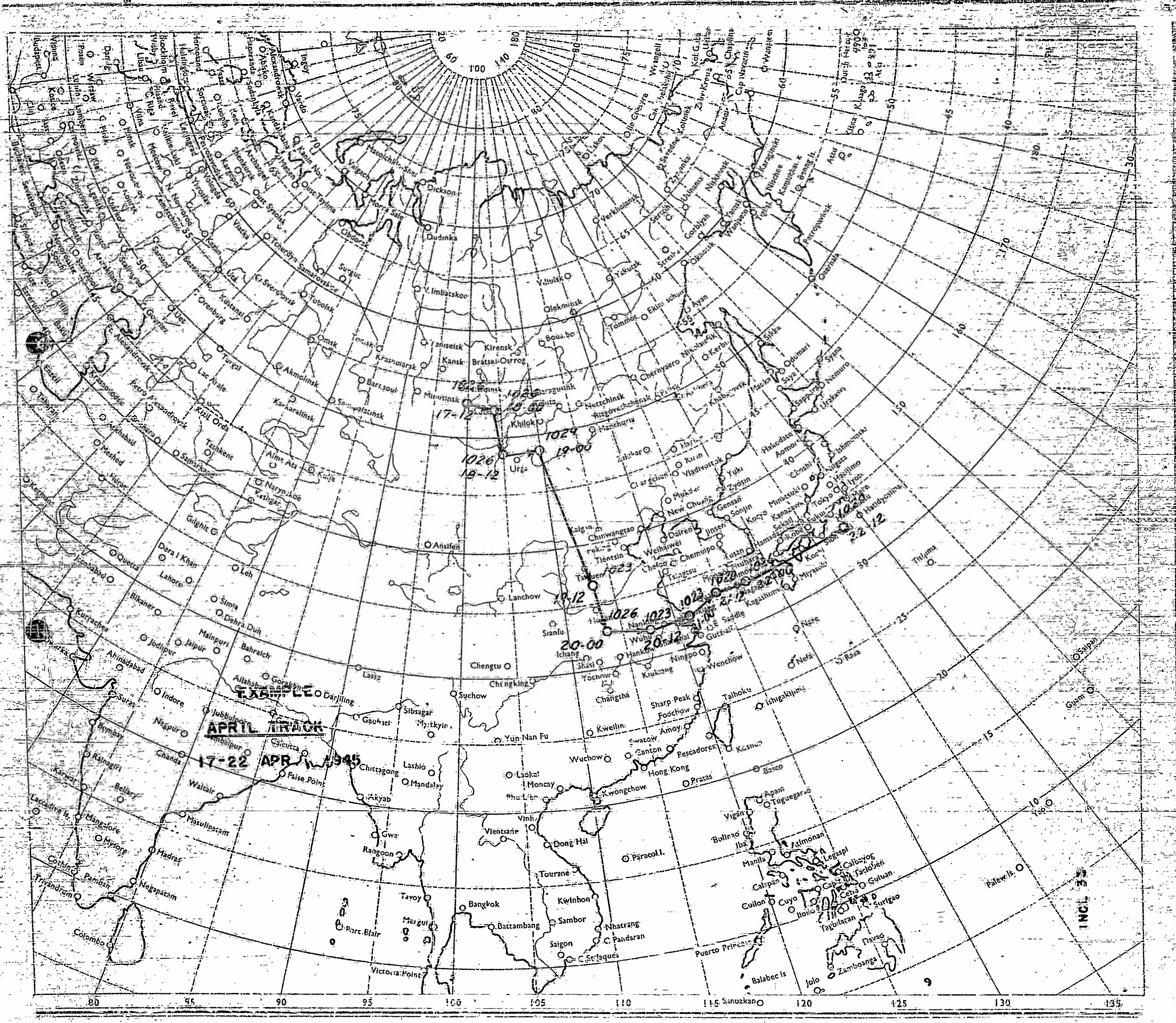
EXAMPLE
APRIL TRACK
17-22 APR 1945
1026
19-12
1029
19-00
17-12
1023
1026
1023
20-00
20-12
21-12
22-12
Dickson
Dudinka
Verkhoiansk
Yakutsk
Olekminsk
Tobolsk
Omsk
Tomsk
Krasnoiarsk
Kansk
Kirensk
Minusinsk
Khilok
Urga
Manchuria
Blagoveshchensk
Khabarovsk
Vladivostok
Mukden
New Chuang
Dairen
Chemulpo
Fusan
Gensan
Kalgan
Peking
Tientsin
Chefoo
Weihaiwei
Tsingtau
Taiyuen
Nanking
Hankow
Ichang
Shasi
Changsha
Kiukiang
Ningpo
Wenchow
Foochow
Amoy
Swatow
Canton
Hong Kong
Pescadores
Pratas
Kwongchow
Tokyo
Kobe
Nagasaki
Kagoshima
Niigata
Hakodate
Aomori
Sapporo
Nemuro
Tashkent
Samarkand
Kashgar
Lhasa
Leh
Lahore
Simla
Dehra Dun
Jodhpur
Jaipur
Mainpuri
Bahraich
Darjiling
Indore
Jubbulpore
Nagpur
Chanda
Calcutta
Chittagong
False Point
Waltair
Madras
Masulipatam
Negapatam
Bombay
Mangalore
Mysore
Cochin
Trivandrum
Colombo
Akyab
Mandalay
Lashio
Myitkyina
Rangoon
Tavoy
Mergui
Port Blair
Victoria Point
Bangkok
Battambang
Saigon
Sambor
Nhatrang
Kwinhon
Tourane
Dong Hai
Vientiane
Vinh
Paracel I.
Manila
Legaspi
Cebu
Iloilo
Davao
Zamboanga
Jolo
Balabac Is
Puerto Princesa
Formosa
Guam
Saipan
Palew Is.
Chengtu
Chungking
Suchow
Yun Nan Fu
Kweilin
Wuchow
Lanchow
Sianfu
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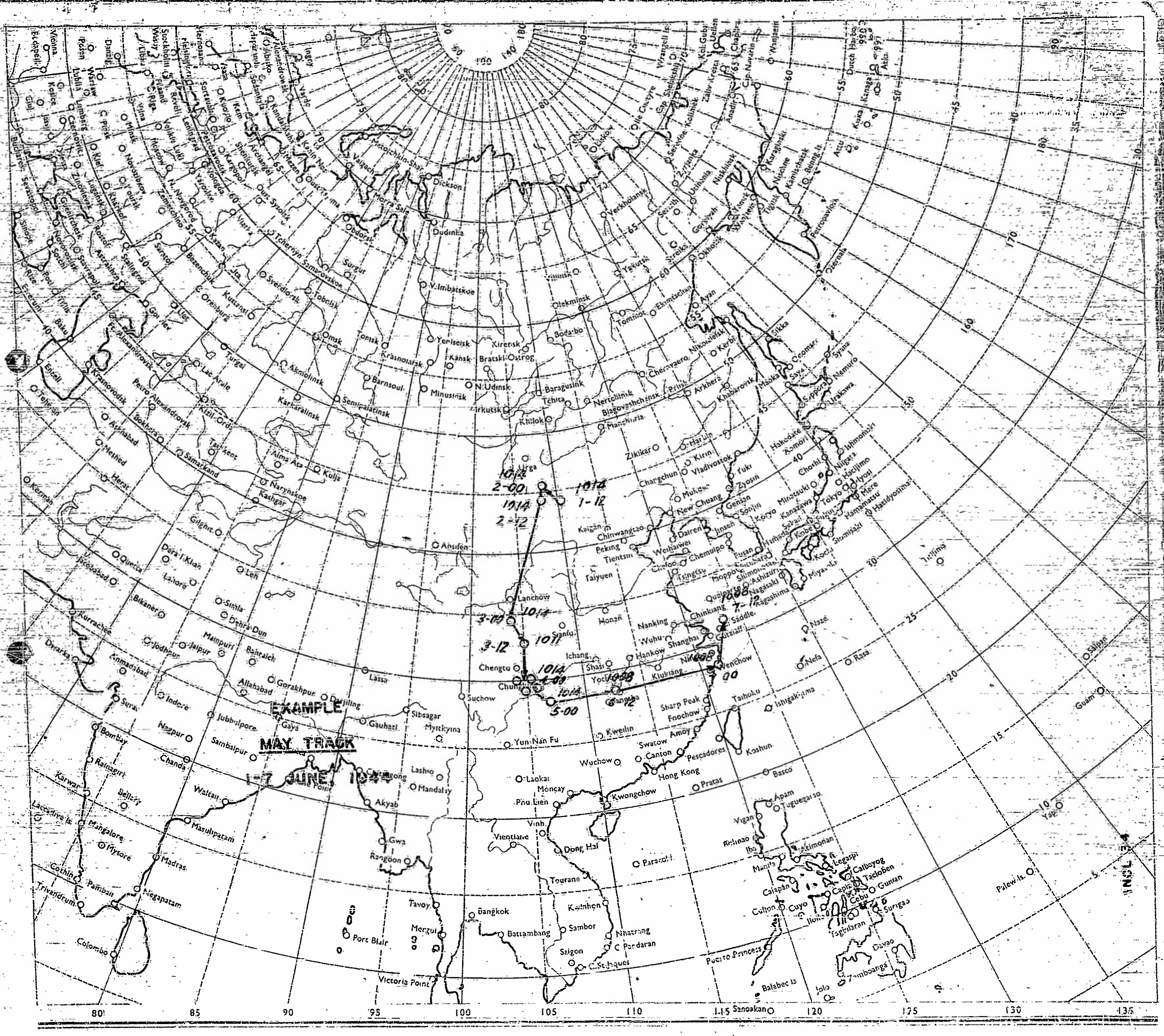
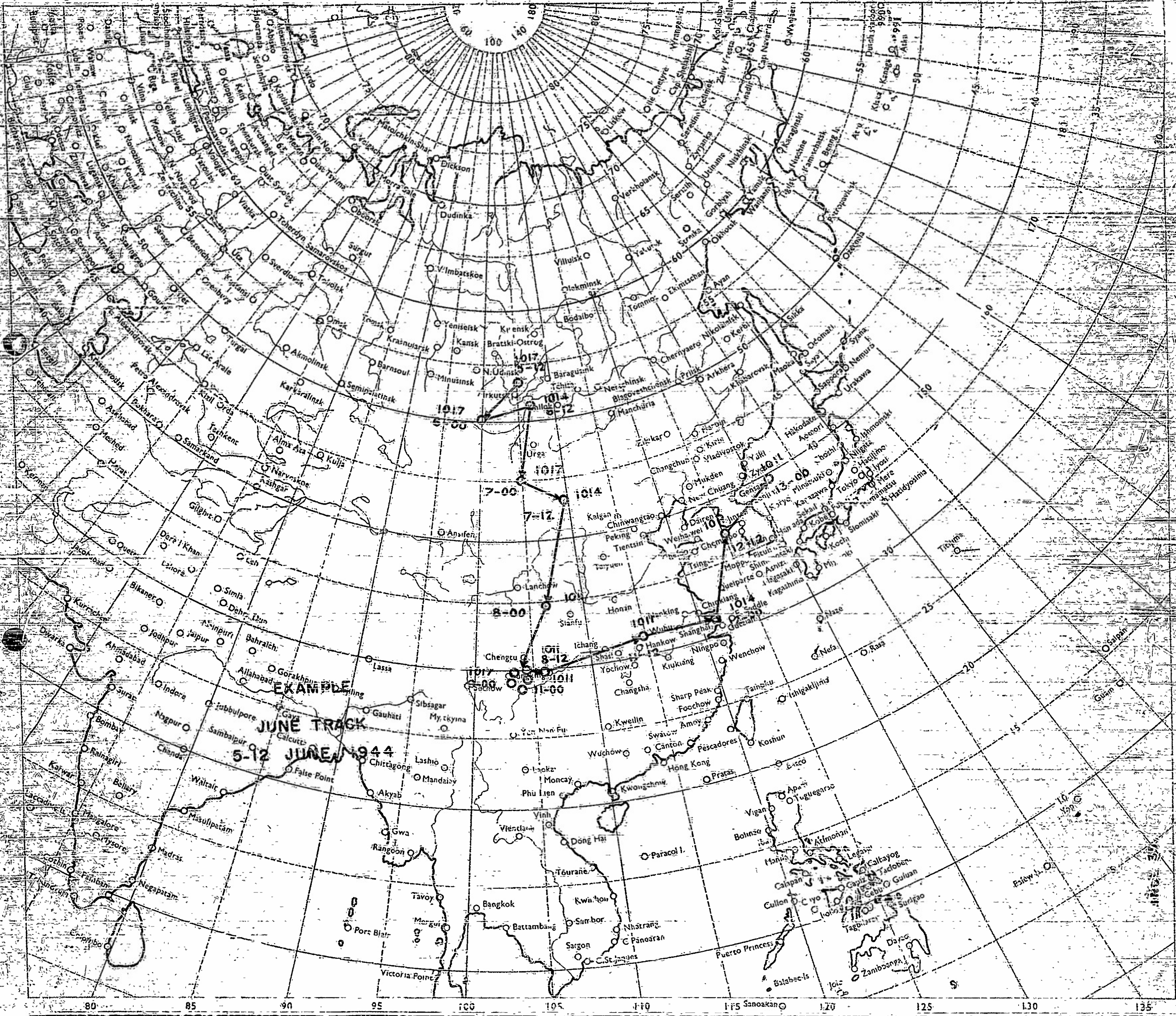
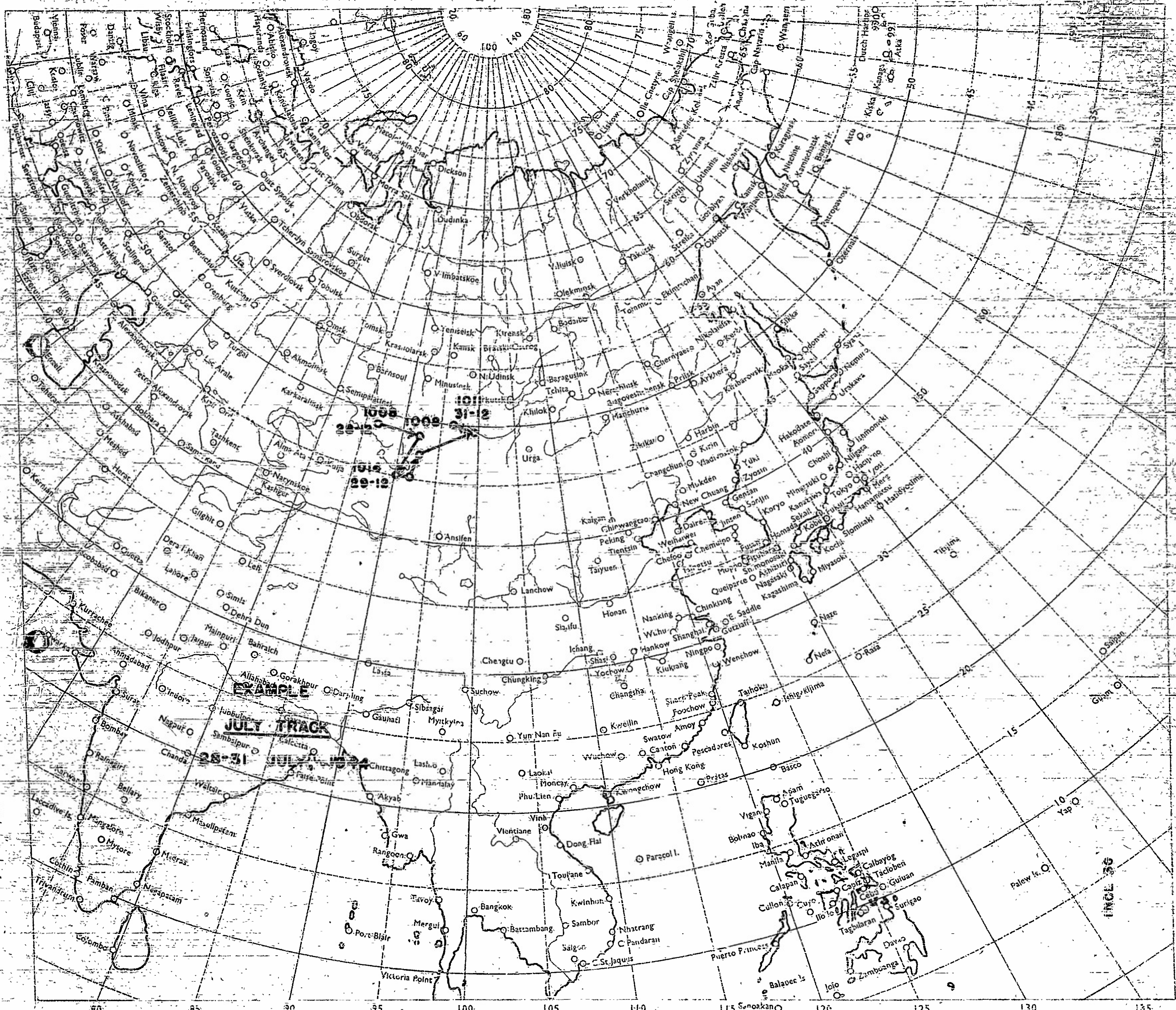


EXAMPLE
MAY TRACK
1-7 JUNE, 1944
1014
2-00
1014
1-12
1014
2-12
1014
3-00
1011
3-12
1014
4-00
1014
5-00
1008
7-12


EXAMPLE
JUNE TRACK
5-12 JUNE 1944
1017
5-12
1017
5-00
1014
6-12
1017
7-00
1014
7-12
8-00
1011
8-12
1017
11-00
1011
1014
12-12
1011
13-00


EXAMPLE
JULY TRACK
28-31
1008
1009
1011
31-12
29-12
INCL. 36
80
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115
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Dickson
Dudinka
Obdorsk
Surgut
Tobolsk
Sverdlovsk
Yakutsk
Olekminsk
Verkholansk
Okhotsk
Petropavlovsk
Omsk
Tomsk
Krasnoiarsk
Kansk
Minusinsk
Barnaoul
Akmolinsk
Semipalatinsk
Karkaralinsk
Tashkent
Samarkand
Bokhara
Alma Ata
Kuldja
Kashgar
Gilghit
Leh
Lahore
Simla
Dehra Dun
Jodhpur
Jaipur
Ahmadabad
Bombay
Indore
Nagpur
Allahabad
Gorakhpur
Darjiling
Calcutta
Chittagong
Akyab
Mandalay
Lashio
Myitkyina
Rangoon
Bangkok
Battambang
Saigon
Vientiane
Hong Kong
Canton
Amoy
Foochow
Swatow
Wenchow
Ningpo
Shanghai
Nanking
Wuhu
Hankow
Ichang
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Chungking
Lanchow
Urga
Harbin
Kirin
Mukden
Changchun
Peking
Tientsin
Taiyuen
Chefoo
Weihaiwei
Dairen
Genzan
Kobe
Tokyo
Sapporo
Nagasaki
Kagoshima
Taihoku
Pescadores
Koshun
Manila
Legaspi
Calbayog
Tacloban
Guiuan
Cebu
Surigao
Davao
Zamboanga
Iloilo
Puerto Princesa
Balabac Is.
Palew Is.
Yap
Guam
Madras
Negapatam
Colombo
Trivandrum
Cochin
Pamban
Mangalore
Mysore
Bellary
Waltair
Masulipatam
Kurrachee
Bikaner
Quetta
Herat
Meshed
Kerman
Teheran
Astrabad
Krasnovodsk
Baku
Tiflis
Batum
Erzerum
Astrakhan
Orenburg
Saratov
Kazan
Moscow
Leningrad
Archangel
Vologda
Yaroslavl
Warsaw
Danzig
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Helsingfors
Libau
Riga
Reval
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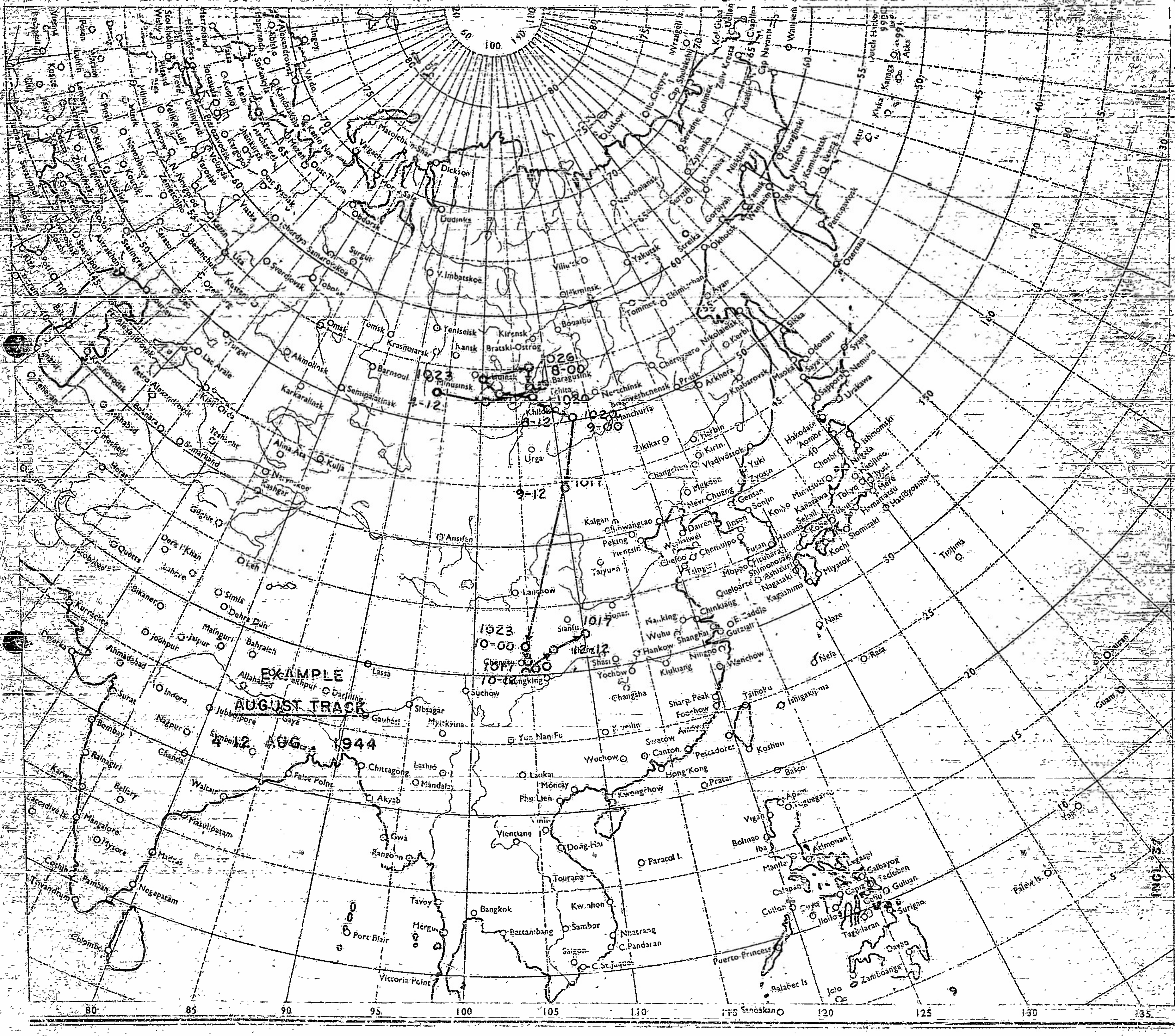
Attu
Kiska
Atka
Dutch Harbor


EXAMPLE
AUGUST TRACK
4-12 AUG. 1944
1023
4-12
1026
8-00
1020
1022
9-00
8-12
1017
9-12
1023
10-00
1017
10-12
12
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Dudinka
Obdorsk
Surgut
Tobolsk
Sverdlovsk
Omsk
Tomsk
Krasnoiarsk
Yeniseisk
Kansk
Kirensk
Bratski-Ostrog
Irkutsk
Minusinsk
Barnaoul
Semipalatinsk
Akmolinsk
Karkaralinsk
Alma Ata
Kulja
Kashgar
Gilgit
Quetta
Leh
Simla
Dehra Dun
Jodhpur
Jaipur
Bahraich
Allahabad
Indore
Nagpur
Surat
Bombay
Ratnagiri
Karwar
Bellary
Mangalore
Mysore
Madras
Masulipatam
Waltair
Negapatam
Pamban
Cochin
Trivandrum
Colombo
Lassa
Darjiling
Gaya
Gauhati
Sibsagar
Myitkyina
Lashio
Mandalay
Chittagong
False Point
Akyab
Gwa
Rangoon
Tavoy
Mergui
Port Blair
Victoria Point
Bangkok
Battambang
Sambor
Saigon
C. St. Jaques
Nhatrang
C. Pandaran
Kwinhon
Tourane
Dong-Hai
Vientiane
Moncay
Laokai
Yun Nan Fu
Kweilin
Suchow
Chungking
Changsha
Yochow
Shasi
Hankow
Kiukiang
Wuhu
Nanking
Shanghai
Ningpo
Wenchow
Foochow
Sharp Peak
Amoy
Swatow
Canton
Hong Kong
Wuchow
Kwangchow
Pescadores
Pratas
Taihoku
Koshun
Basco
Aparri
Tuguegarao
Vigan
Bolinao
Iba
Manila
Legaspi
Calbayog
Tacloban
Guiuan
Calapan
Cuyo
Iloilo
Cebu
Tagbilaran
Surigao
Culion
Puerto Princesa
Balabac Is
Jolo
Zamboanga
Davao
Sandakan
Palew Is.
Yap
Guam
Naze
Nafa
Raza
Ishigakijima
Miyasaki
Kagoshima
Nagasaki
Shimonoseki
Kochi
Kobe
Tokyo
Niigata
Choshi
Hakodate
Aomori
Sapporo
Urakawa
Nemuro
Soya
Odomari
Maoka
Sikka
Nikolaievsk
Kerbi
Khabarovsk
Arkhera
Blagoveshchensk
Nerchinsk
Tchita
Khilok
Manchuria
Harbin
Kirin
Vladivostok
Yuki
Gensan
Seishin
Mukden
New Chuang
Dairen
Weihaiwei
Chefoo
Chemulpo
Fusan
Tsingtao
Tientsin
Peking
Kalgan
Chinwangtao
Taiyuan
Lanchow
Sianfu
Urga
Zikikar
Changchun
Yakutsk
Olekminsk
Vilyuisk
Bodaibo
Verkhoiansk
Okhotsk
Ayan
Petropavlovsk
Ozernaia
Anadir
Attu
Kiska
Dutch Harbor
Atka
Wrangell Is.
Tiflis
Baku
Teheran
Meshed
Ashkhabad
Bokhara
Samarkand
Tashkent
Krasnovodsk
Turgai
Orenburg
Ufa
Kazan
Saratov
Stalingrad
Astrakhan
Moscow
Leningrad
Archangel
Murmansk
Odessa
Kiev
Warsaw
Stockholm
Helsingfors
Vologda
Yaroslavl
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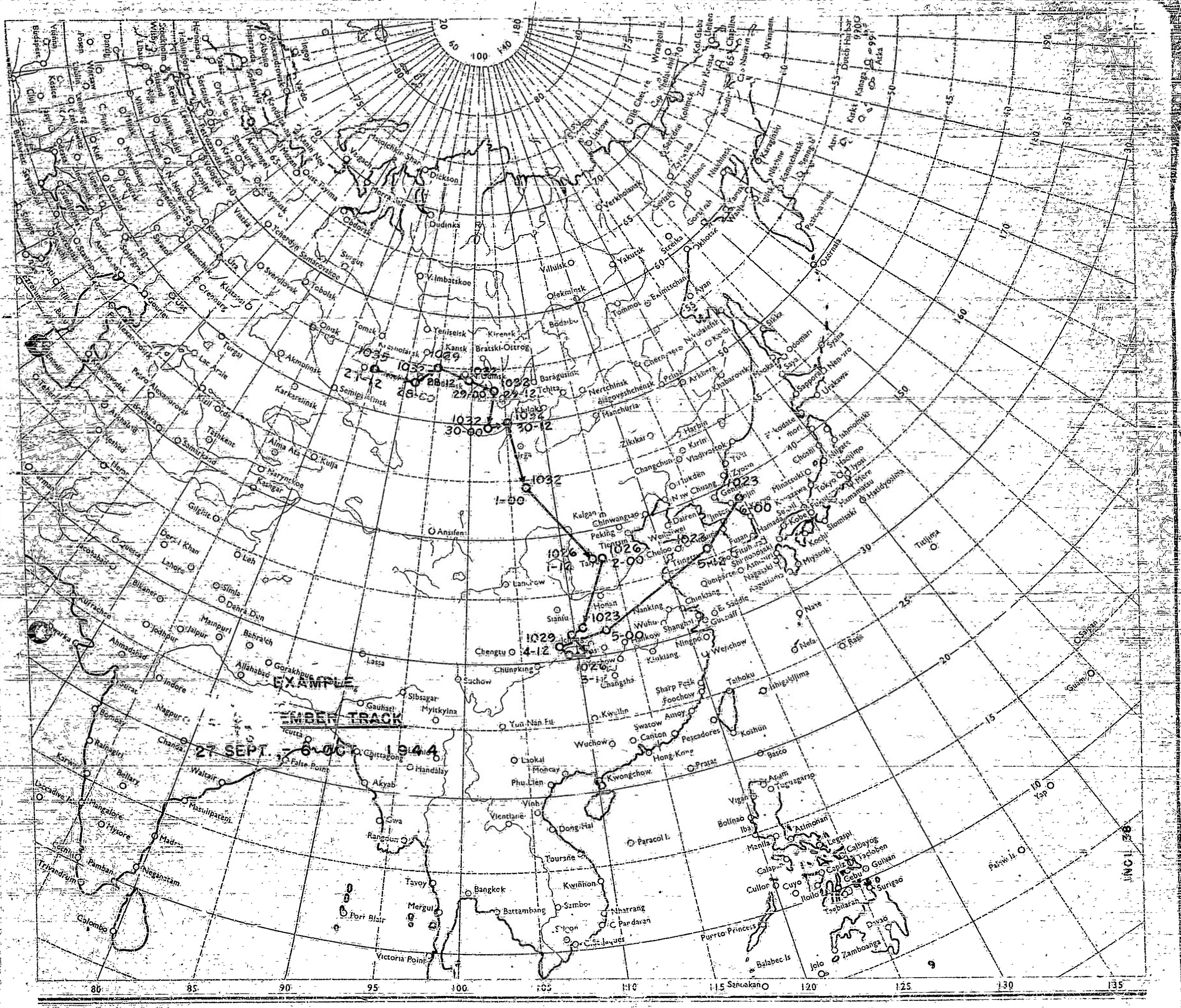
EXAMPLE
EMBER TRACK
27 SEPT. - 6 OCT. 1944
1035
27-12
1032
28-12
1029
28-00
29-00
29-12
1032
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1032
30-12
1032
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1-12
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2-00
1023
1029
4-12
5-00
1026
5-12
1023
6-00
Tokyo
Kobe
Shanghai
Nanking
Hankow
Peking
Tientsin
Mukden
Harbin
Vladivostok
Khabarovsk
Dairen
Tsingtao
Chungking
Chengtu
Canton
Hong Kong
Amoy
Foochow
Swatow
Kwangchow
Manila
Legaspi
Surigao
Davao
Zamboanga
Puerto Princesa
Jolo
Sandakan
Saipan
Guam
Yap
Palau Is.
Rangoon
Akyab
Chittagong
Mandalay
Myitkyina
Bangkok
Saigon
Tourane
Vinh
Laokai
Hanoi
Yun-Nan Fu
Kweilin
Changsha
Wuchow
Lanchow
Kalgan
Ansifen
Bombay
Madras
Colombo
Calcutta
Karachi
Delhi
Simla
Lahore
Leh
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Irkutsk
Kansk
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Tomsk
Omsk
Semipalatinsk
Akmolinsk
Karkaralinsk
Sverdlovsk
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Yakutsk
Verkhoiansk
Dickson
Dudinka
Petropavlovsk
Sapporo
Hakodate
Tchita
Nertchinsk
Blagoveshchensk
Nikolaiefsk
Urga
Manchuria
Yeniseisk
Kirensk
Bratski-Ostrog
Barnaul
Taiwan
Taihoku
Pescadores
Pratas
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Vigan
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Cebu
Tacloban
Gauhati
Sibsagar
Lassa
Chinkiang
Ningpo
Wenchow
Hangchow
Kiukiang
Nagasaki
Shimonoseki
Fusan
Genzan
Jinsen
Port Blair
Mergui
Tavoy
Victoria Point
Battambang
Paracel I.
Dong Hai
Vientiane
Phu Lien
Moncay
False Point
Masulipatam
Waltair
Mangalore
Mysore
Trivandrum
Bellary
Nagpur
Indore
Surat
Ahmadabad
Jodhpur
Jaipur
Allahabad
Gorakhpur
Bahraich
Mainpuri
Dehra Dun
Bikaner
Jacobabad
Dera-i-Khan
Teheran
Meshed
Herat
Bokhara
Tehardjui
Astrakhan
Kazan
Perm
Leningrad
Archangel
Moscow
Kiev
Odessa
Warsaw
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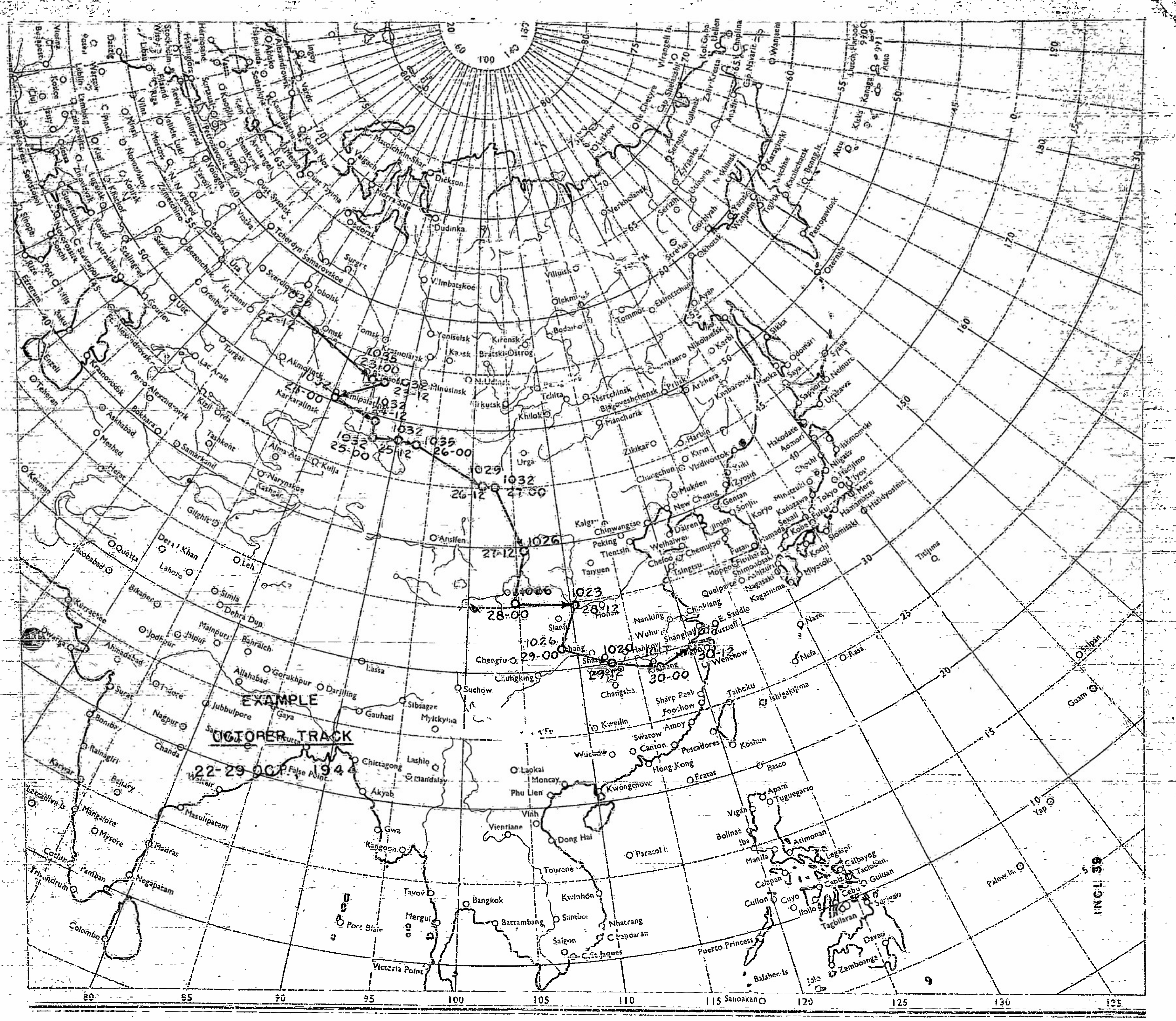
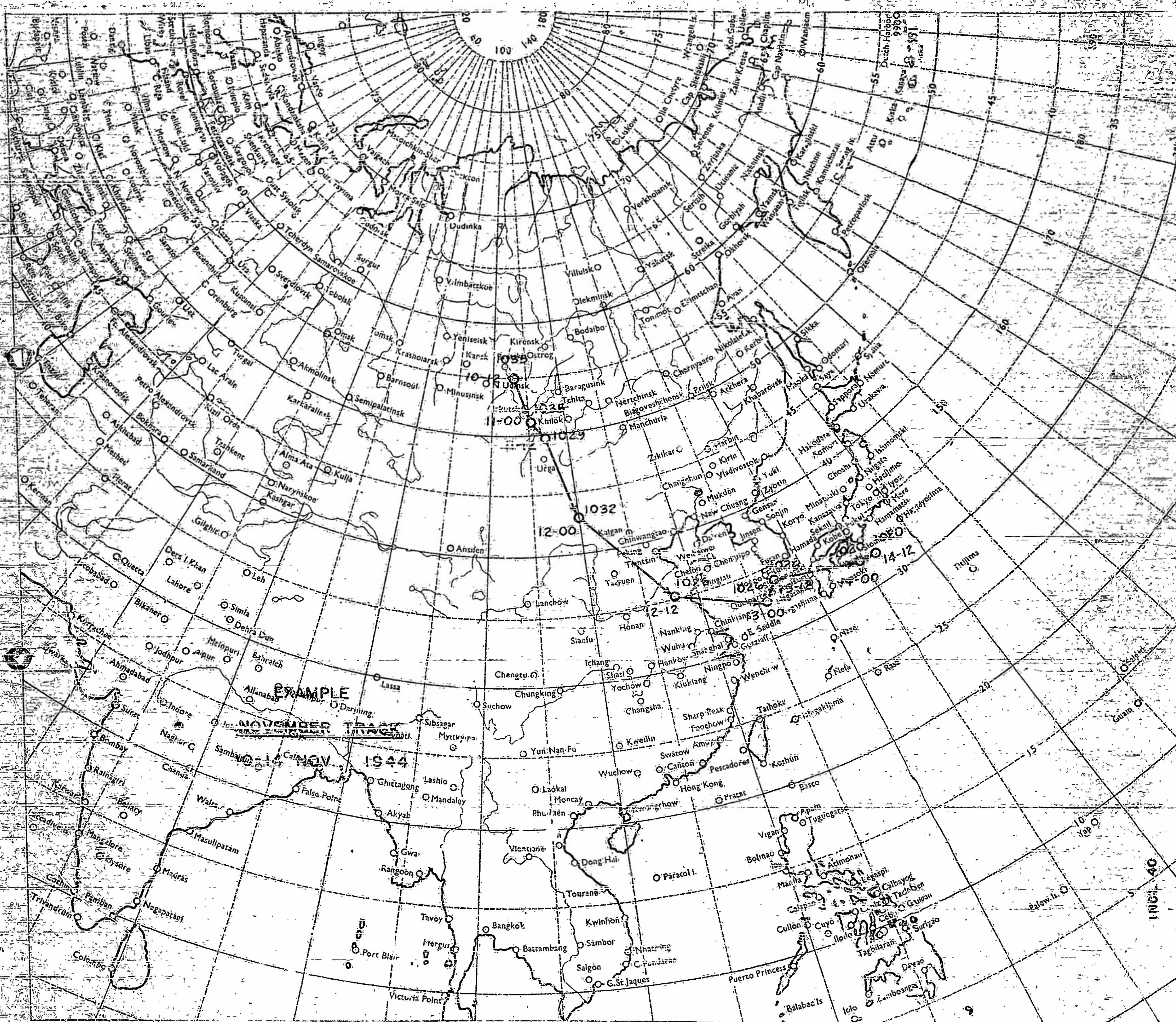
INCL 38


EXAMPLE
OCTOBER TRACK
22-29 OCT. 194
INCL 39


EXAMPLE
NOVEMBER TRACK
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1036
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1029
11-12
1032
12-00
12-12
13-00
14-00
14-12
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Yakutsk
Okhotsk
Petropavlovsk
Sverdlovsk
Tobolsk
Omsk
Tomsk
Krasnoiarsk
Yeniseisk
Kirensk
Olekminsk
Bodaibo
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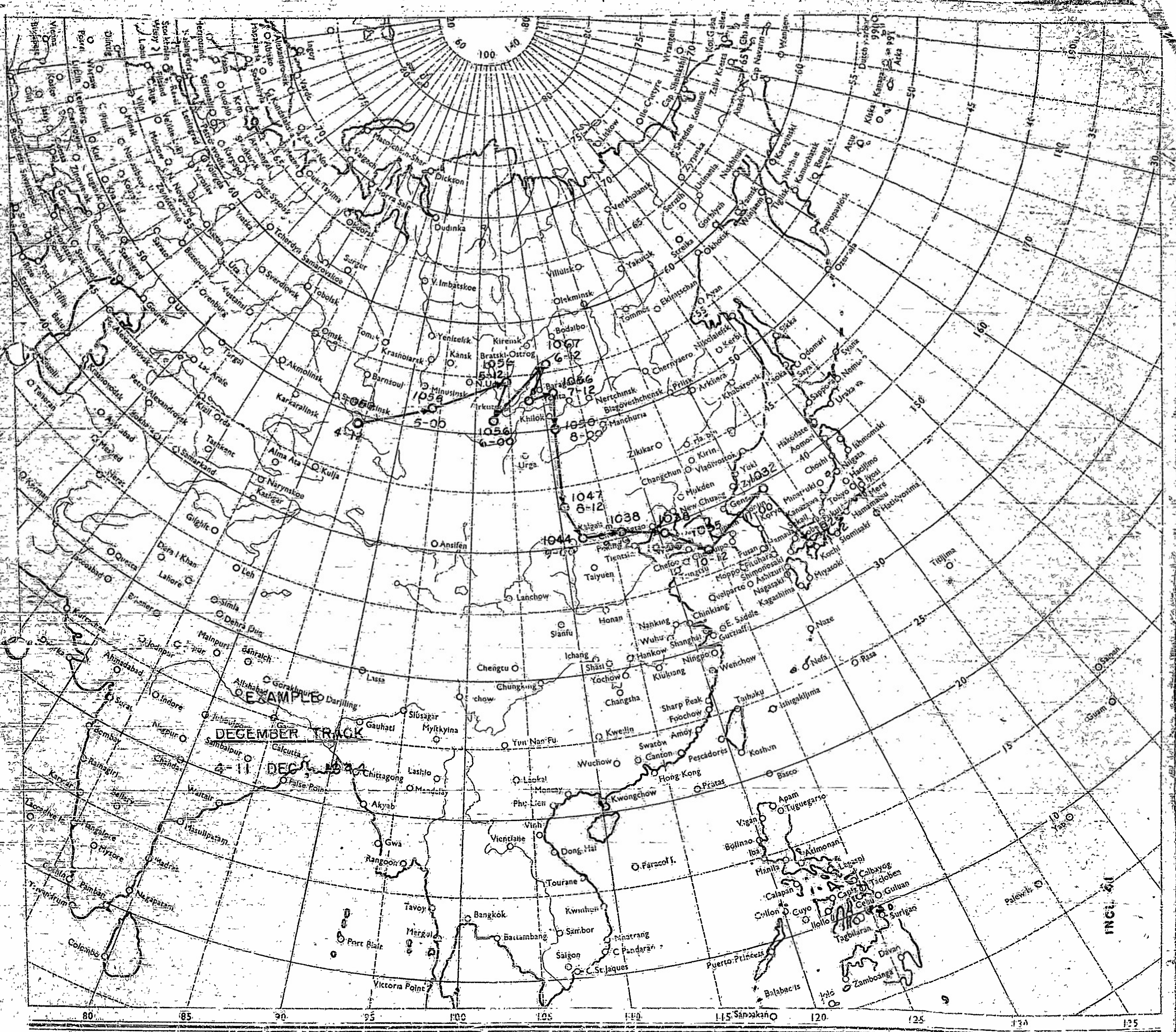
Jodhpur
Ahmadabad
Bikaner
Karachee
Lassa
Darjiling
Sibsagar
Myitkyina
Chittagong
Lashio
Mandalay
Akyab
Rangoon
Tavoy
Mergui
Port Blair
Victoria Point
Bangkok
Battambang
Saigon
C. St Jaques
Tourane
Dong Hai
Vientiane
Paracol I.
Hong Kong
Canton
Swatow
Amoy
Foochow
Taihoku
Koshun
Pratas
Basco
Aparri
Vigan
Manila
Legaspi
Cebu
Surigao
Davao
Zamboanga
Iloilo
Puerto Princesa
Balabac Is
Jolo
Guam
Yap
Palew Is.
Nanking
Shanghai
Hankow
Ichang
Chungking
Chengtu
Suchow
Yun Nan Fu
Kweilin
Wuchow
Laokai
Moncay
Phu Lien
Ningpo
Wenchow
Sapporo
Tokyo
Kobe
Hamada
Fusan
Jinsen
Gensan
Sonjin
Yuki
Nagasaki
Quelpart
Sakhalin
Attu
Kiska
Dutch Harbor
Bombay
Surat
Nagpur
Indore
Allahabad
Calcutta
False Point
Masulipatam
Madras
Negapatam
Colombo
Trivandrum
Cochin
Mangalore
Bellary
Ratnagiri
Chanda
Sambalpur
Waltair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Bangkok
Battambang
Saigon
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Moscow
Leningrad
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Kochi
Tokyo
Niigata
Aomori
Hakodate
Sapporo
Nemuro
Odomari
Urakawa
Choshi
Hachijo
Hatiziyosima
Nafa
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Basco
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